WHAT IS CLAIMED IS:

1. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises overlay misregistration of the specimen.

2. The system of claim 1, wherein the stage is further configured to move laterally during use.

3. The system of claim 1, wherein the stage is further configured to move rotatably during use.

4. The system of claim 1, wherein the stage is further configured to move laterally and rotatably during use.

5. The system of claim 1, wherein the illumination system comprises a single energy source.

6. The system of claim 1, wherein the illumination system comprises more than one energy sources.

7. The system of claim 1, wherein the detection system comprises a single energy sensitive device.

8. The system of claim 1, wherein the detection system comprises more than one energy sensitive devices.

9. The system of claim 1, wherein the measurement device further comprises a non-imaging scatterometer.

10. The system of claim 1, wherein the measurement device further comprises a scatterometer.

11. The system of claim 1, wherein the measurement device further comprises a spectroscopic scatterometer.

12. The system of claim 1, wherein the measurement device further comprises a reflectometer.

13. The system of claim 1, wherein the measurement device further comprises a spectroscopic reflectometer.

14. The system of claim 1, wherein the measurement device further comprises an ellipsometer.

15. The system of claim 1, wherein the measurement device further comprises a spectroscopic ellipsometer.

16. The system of claim 1, wherein the measurement device further comprises a bright field imaging device.

17. The system of claim 1, wherein the measurement device further comprises a dark field imaging device.

18. The system of claim 1, wherein the measurement device further comprises a bright field and a dark field imaging device.

19. The system of claim 1, wherein the measurement device further comprises a bright field non-imaging device.

20. The system of claim 1, wherein the measurement device further comprises a dark field non-imaging device.

21. The system of claim 1, wherein the measurement device further comprises a bright field and a dark field non-imaging device.

22. The system of claim 1, wherein the measurement device further comprises a coherence probe microscope.

23. The system of claim 1, wherein the measurement device further comprises an interference microscope.

24. The system of claim 1, wherein the measurement device further comprises an optical profilometer.

25. The system of claim 1, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and a dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and a dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

26. The system of claim 1, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

27. The system of claim 1, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property comprises a presence of defects on the specimen.

28. The system of claim 27, wherein the defects comprise micro defects and macro defects.

29. The system of claim 27, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the third property further comprises a presence of defects on the bottom surface of the specimen.

30. The system of claim 29, wherein the defects comprise macro defects.

31. The system of claim 1, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property comprises a flatness measurement of the specimen.

32. The system of claim 1, wherein the processor is further configured to determine a third property and a fourth property of the specimen from the one or more output signals during use, wherein the third property comprises a presence of defects on the specimen, and wherein the fourth property comprises a flatness measurement of the specimen.

33. The system of claim 1, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

34. The system of claim 33, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

35. The system of claim 1, wherein the system is further configured to determine at least two properties of the specimen simultaneously during use.

36. The system of claim 1, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

37. The system of claim 1, wherein the system is coupled to a process tool.

38. The system of claim 1, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

39. The system of claim 1, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

40. The system of claim 1, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

41. The system of claim 1, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

42. The system of claim 1, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

43. The system of claim 1, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

44. The system of claim 1, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

45. The system of claim 1, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

46. The system of claim 1, wherein the system is coupled to a process tool, and wherein the process tool comprises a lithography tool.

47. The system of claim 1, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

48. The system of claim 1, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

49. The system of claim 1, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

50. The system of claim 1, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

51. The system of claim 1, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

52. The system of claim 51, wherein the processor is further configured to determine at least the two properties of the specimen during the process step.

53. The system of claim 51, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

54. The system of claim 51, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique during use.

55. The system of claim 1, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

56. The system of claim 1, wherein a process tool comprises a first process chamber and a second process chamber, wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the processor is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

57. The system of claim 1, wherein a process tool comprises a first process chamber and a second process chamber, wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use, wherein the processor is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber, and wherein the process tool comprises a lithography tool.

58. The system of claim 57, wherein the first process chamber is configured to chill the specimen during use, and wherein the second process chamber is configured to apply resist to the specimen during use.

59. The system of claim 57, wherein the first process chamber is configured to chill the specimen subsequent to a post apply bake process step during use, and wherein the second process chamber is configured to expose the specimen during use.

60. The system of claim 57, wherein the first process chamber is configured to expose the specimen during use, and wherein the second process chamber is configured to bake the specimen subsequent to exposure of the specimen during use.

61. The system of claim 57, wherein the first process chamber is configured to chill the specimen subsequent to a post exposure bake process step during use, and wherein the second process chamber is configured to develop the specimen during use.

62. The system of claim 57, wherein the first process chamber is configured to develop the specimen during use, and wherein the second process chamber is configured to bake the specimen subsequent to a develop process step during use.

63. The system of claim 57, wherein the first process chamber is configured to develop the specimen during use, and wherein the second process chamber is configured to receive the specimen in a wafer cassette during use.

64. The system of claim 1, wherein the processor is further configured to compare the determined properties of the specimen and properties of a plurality of specimens during use.

65. The system of claim 1, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property.

66. The system of claim 1, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property, and wherein the processor is further configured to generate an output signal if the determined property of the specimen is outside of the predetermined range during use.

67. The system of claim 1, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to the determined first or second property of the specimen during use.

68. The system of claim 1, wherein the processor is further configured to alter a parameter of an instrument coupled to the measurement device in response to the determined first or second property using a feedback control technique during use.

69. The system of claim 1, wherein the processor is further configured to alter a parameter of an instrument coupled to the measurement device in response to the determined first or second property using a feedforward control technique during use.

70. The system of claim 1, wherein the processor is further configured to generate a database during use, and wherein the database comprises the determined first and second properties of the specimen.

71. The system of claim 70, wherein the processor is further configured to calibrate the measurement device using the database during use.

72. The system of claim 70, wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

73. The system of claim 70, wherein the database further comprises first and second properties of a plurality of specimens.

74. The system of claim 73, wherein the first and second properties of the plurality of specimens are determined using the measurement device.

75. The system of claim 73, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

76. The system of claim 75, wherein the processor is further coupled to the plurality of measurement devices.

77. The system of claim 76, wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

78. The system of claim 76, wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

79. The system of claim 1, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

80. The system of claim 1, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is

further configured to calibrate the system and at least the one additional system during use.

81. The system of claim 1, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

82. The system of claim 1, wherein the processor is further coupled to a process tool.

83. The system of claim 82, wherein the process tool comprises a lithography tool.

84. The system of claim 82, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedback control technique during use.

85. The system of claim 82, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedforward control technique during use.

86. The system of claim 82, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

87. The system of claim 86, wherein the processor is further configured to determine a relationship between the determined properties and at least one of the monitored parameters during use.

88. The system of claim 87, wherein the processor is further configured to alter the parameter of the one or more instruments in response to the determined relationship during use.

89. The system of claim 1, wherein the processor is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

90. The system of claim 1, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

91. The system of claim 90, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

92. The system of claim 90, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

93. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises overlay misregistration of the specimen.

94. The method of claim 93, further comprising laterally moving the stage during said directing energy and said detecting energy.

95. The method of claim 93, further comprising rotatably moving the stage during said directing energy and said detecting energy.

96. The method of claim 93, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

97. The method of claim 93, wherein the illumination system comprises a single energy source.

98. The method of claim 93, wherein the illumination system comprises more than one energy source.

99. The method of claim 93, wherein the detection system comprises a single energy sensitive device.

100. The method of claim 93, wherein the detection system comprises more than one energy sensitive devices.

101. The method of claim 93, wherein the measurement device further comprises a non-imaging scatterometer.

102. The method of claim 93, wherein the measurement device further comprises a scatterometer.

103. The method of claim 93, wherein the measurement device further comprises a spectroscopic scatterometer.

104. The method of claim 93, wherein the measurement device further comprises a reflectometer.

105. The method of claim 93, wherein the measurement device further comprises a spectroscopic reflectometer.

106. The method of claim 93, wherein the measurement device further comprises an ellipsometer.

107. The method of claim 93, wherein the measurement device further comprises a spectroscopic ellipsometer.

108. The method of claim 93, wherein the measurement device further comprises a bright field imaging device.

109. The method of claim 93, wherein the measurement device further comprises a dark field imaging device.

110. The method of claim 93, wherein the measurement device further comprises a bright field and dark field imaging device.

111. The method of claim 93, wherein the measurement device further comprises a bright field non-imaging device.

112. The method of claim 93, wherein the measurement device further comprises a dark field non-imaging device.

113. The method of claim 93, wherein the measurement device further comprises a bright field and dark field non-imaging device

114. The method of claim 93, wherein the measurement device further comprises a coherence probe microscope.

115. The method of claim 93, wherein the measurement device further comprises an interference microscope.

116. The method of claim 93, wherein the measurement device further comprises an optical profilometer.

117. The method of claim 93, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

118. The method of claim 93, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

119. The method of claim 93, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a presence of defects on the specimen.

120. The method of claim 93, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a presence of defects on the specimen, and wherein the defects comprise micro defects and macro defects.

121. The method of claim 93, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a presence of defects on the specimen, the method further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the third property further comprises a presence of defects on the bottom surface of the specimen.

122. The method of claim 121, wherein the defects comprise macro defects.

123. The method of claim 93, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a flatness measurement of the specimen.

124. The method of claim 93, further comprising processing the one or more output signals to determine a third property and a fourth property of the specimen, wherein the third property comprises a presence of defects on the specimen, and wherein the fourth property comprises a flatness measurement of the specimen.

125. The method of claim 93, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

126. The method of claim 125, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

127. The method of claim 93, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

128. The method of claim 93, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

129. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool.

130. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

131. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

132. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

133. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

134. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

135. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

136. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

137. The method of claim 93, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

138. The method of claim 93, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

139. The method of claim 93, wherein the stage and the measurement device are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

140. The method of claim 93, wherein the stage and the measurement device are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

141. The method of claim 93, wherein the stage and the measurement device are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

142. The method of claim 93, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

143. The method of claim 142, further comprising performing said directing and said detecting during the process step.

144. The method of claim 143, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

145. The method of claim 143, further comprising altering a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique.

146. The method of claim 93, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

147. The method of claim 146, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

148. The method of claim 146, wherein the process tool comprises a lithography tool.

149. The method of claim 148, further comprising:

chilling the specimen in the first process chamber; and

applying resist to the specimen in the second process chamber.

150. The method of claim 148, further comprising:

chilling the specimen in the first process chamber subsequent to a post apply bake process step; and

exposing the specimen in the second process chamber.

151. The method of claim 148, further comprising:

exposing the specimen in the first process chamber; and

baking the specimen subsequent to exposure of the specimen in the second process chamber.

152. The method of claim 148, further comprising:

chilling the specimen in the first process chamber subsequent to a post exposure bake process step; and

developing the specimen in the second process chamber.

153. The method of claim 148, further comprising:

developing the specimen in the first process chamber; and

baking the specimen in the second process chamber subsequent to a develop process step.

154. The method of claim 148, further comprising:

developing the specimen in the first process chamber; and

receiving the specimen in a wafer cassette in the second process chamber.

155. The method of claim 93, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

156. The method of claim 93, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

157. The method of claim 93, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property and generating an output signal if the determined property of the specimen is outside of the predetermined range.

158. The method of claim 93, further comprising altering a sampling frequency of the measurement device in response to the determined first or second property of the specimen.

159. The method of claim 93, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique.

160. The method of claim 93, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique.

161. The method of claim 93, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

162. The method of claim 161, further comprising calibrating the measurement device using the database.

163. The method of claim 161, further comprising monitoring output signals generated by the measurement device using the database.

164. The method of claim 161, wherein the database further comprises first and second properties of a plurality of specimens.

165. The method of claim 164, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

166. The method of claim 165, further comprising calibrating the plurality of measurement devices using the database.

167. The method of claim 165, further comprising monitoring output signals generated by the plurality of measurement devices using the database.

168. The method of claim 93, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

169. The method of claim 93, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

170. The method of claim 93, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one

of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

171. The method of claim 93, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen.

172. The method of claim 93, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedback control technique.

173. The method of claim 93, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedforward control technique.

174. The method of claim 93, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

175. The method of claim 93, further comprising monitoring a parameter of one or more instruments coupled to a process tool and determining a relationship between the determined properties and at least one of the monitored parameters.

176. The method of claim 93, further comprising monitoring a parameter of one or more instruments coupled to a process tool, determining a relationship between the determined properties and at least one of the monitored parameters, and altering the parameter of the one or more instruments in response to the relationship.

177. The method of claim 93, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to the determined first or second property of the specimen.

178. The method of claim 93, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

179. The method of claim 178, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

180. The method of claim 178, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

181. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises overlay misregistration of the specimen.

182. The method of claim 181, further comprising controlling the stage, wherein the stage is configured to support the specimen.

183. The method of claim 181, further comprising controlling the stage to move laterally during said directing energy and said detecting energy.

184. The method of claim 181, further comprising controlling the stage to move rotatably during said directing energy and said detecting energy.

185. The method of claim 181, further comprising controlling the stage to move laterally and rotatably during said directing energy and said detecting energy.

186. The method of claim 181, wherein the illumination system comprises a single energy source.

187. The method of claim 181, wherein the illumination system comprises more than one energy source.

188. The method of claim 181, wherein the detection system comprises a single energy sensitive device.

189. The method of claim 181, wherein the detection system comprises more than one energy sensitive devices.

190. The method of claim 181, wherein the measurement device further comprises a non-imaging scatterometer.

191. The method of claim 181, wherein the measurement device further comprises a scatterometer.

192. The method of claim 181, wherein the measurement device further comprises a spectroscopic scatterometer.

193. The method of claim 181, wherein the measurement device further comprises a reflectometer.

194. The method of claim 181, wherein the measurement device further comprises a spectroscopic reflectometer.

195. The method of claim 181, wherein the measurement device further comprises an ellipsometer.

196. The method of claim 181, wherein the measurement device further comprises a spectroscopic ellipsometer.

197. The method of claim 181, wherein the measurement device further comprises a bright field imaging device.

198. The method of claim 181, wherein the measurement device further comprises a dark field imaging device.

199. The method of claim 181, wherein the measurement device further comprises a bright field and dark field imaging device.

200. The method of claim 181, wherein the measurement device further comprises a bright field non-imaging device.

201. The method of claim 181, wherein the measurement device further comprises a dark field non-imaging device.

202. The method of claim 181, wherein the measurement device further comprises a bright field and dark field non-imaging device.

203. The method of claim 181, wherein the measurement device further comprises a coherence probe microscope.

204. The method of claim 181, wherein the measurement device further comprises an interference microscope.

205. The method of claim 181, wherein the measurement device further comprises an optical profilometer.

206. The method of claim 181, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

207. The method of claim 181, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

208. The method of claim 181, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a presence of defects on the specimen.

209. The method of claim 208, wherein the defects comprise micro defects and macro defects.

210. The method of claim 208, further comprising:

controlling the illumination system to direct energy toward a bottom surface of the specimen; and

controlling the detection system to detect energy propagating from the bottom surface of the specimen, wherein the third property further comprises a presence of defects on the bottom surface of the specimen.

211. The method of claim 210, wherein the defects comprise macro defects.

212. The method of claim 181, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a flatness measurement of the specimen.

213. The method of claim 181, further comprising processing the one or more output signals to determine a third property and a fourth property of the specimen, wherein the third property comprises a presence of defects on the specimen, and wherein the fourth property comprises a flatness measurement of the specimen.

214. The method of claim 181, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

215. The method of claim 214, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

216. The method of claim 181, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

217. The method of claim 181, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

218. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool.

219. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

220. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

221. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

222. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

223. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

224. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

225. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

226. The method of claim 181, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

227. The method of claim 181, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

228. The method of claim 181, wherein the stage and the measurement device are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is disposed within the process tool.

229. The method of claim 181, wherein the stage and the measurement device are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

230. The method of claim 181, wherein the stage and the measurement device are disposed within a measurement chamber, wherein the measurement chamber is coupled to a process tool, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

231. The method of claim 181, wherein the stage comprises a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

232. The method of claim 231, further comprising controlling the illumination system and controlling the detection system during the process step.

233. The method of claim 231, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

234. The method of claim 231, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique.

235. The method of claim 181, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

236. The method of claim 235, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

237. The method of claim 235, wherein the process tool comprises a lithography tool.

238. The method of claim 237, further comprising:

chilling the specimen in the first process chamber; and

applying resist to the specimen in the second process chamber.

239. The method of claim 237, further comprising:

chilling the specimen in the first process chamber subsequent to a post apply bake process step; and

exposing the specimen in the second process chamber.

240. The method of claim 237, further comprising:

exposing the specimen in the first process chamber; and

baking the specimen subsequent to exposure of the specimen in the second process chamber.

241. The method of claim 237, further comprising:

chilling the specimen in the first process chamber subsequent to a post exposure bake process step; and

developing the specimen in the second process chamber.

242. The method of claim 237, further comprising:

developing the specimen in the first process chamber; and

baking the specimen in the second process chamber subsequent to a develop process step.

243. The method of claim 237, further comprising:

developing the specimen in the first process chamber; and

receiving the specimen in a wafer cassette in the second process chamber.

244. The method of claim 181, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

245. The method of claim 181, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

246. The method of claim 245, further comprising generating an output signal if the determined property of the specimen is outside of the predetermined range.

247. The method of claim 181, further comprising altering a sampling frequency of the measurement device in response to the determined first or second properties of the specimen.

248. The method of claim 181, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique.

249. The method of claim 181, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique.

250. The method of claim 181, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

251. The method of claim 250, further comprising calibrating the measurement device using the database.

252. The method of claim 250, further comprising monitoring output signals of the measurement device using the database.

253. The method of claim 250, wherein the database further comprises first and second properties of a plurality of specimens.

254. The method of claim 253, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

255. The method of claim 254, further comprising calibrating the plurality of measurement devices using the database.

256. The method of claim 254, further comprising monitoring output signals of the plurality of measurement devices using the database.

257. The method of claim 181, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

258. The method of claim 181, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

259. The method of claim 181, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and

wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

260. The method of claim 181, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen.

261. The method of claim 181, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedback control technique.

262. The method of claim 181, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedforward control technique.

263. The method of claim 181, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

264. The method of claim 181, further comprising monitoring a parameter of one or more instruments coupled to the process tool and determining a relationship between the determined properties and at least one of the monitored parameters.

265. The method of claim 181, further comprising monitoring a parameter of one or more instruments coupled to the process tool, determining a relationship between the determined properties and at least one of the monitored parameters, and altering the parameter of at least one of the instruments in response to the relationship.

266. The method of claim 181, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to the determined first or second property of the specimen.

267. The method of claim 181, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

268. The method of claim 267, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

269. The method of claim 267, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

270. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the portion of the semiconductor device, wherein the first property comprises a critical dimension of the portion of the semiconductor device, and wherein the second property comprises overlay misregistration of the portion of the semiconductor device.

271. The device of claim 270, wherein the illumination system comprises a single energy source.

272. The device of claim 270, wherein the illumination system comprises more than one energy source.

273. The device of claim 270, wherein the detection system comprises a single energy sensitive device.

274. The device of claim 270, wherein the detection system comprises more than one energy sensitive devices.

275. The device of claim 270, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

276. The device of claim 270, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

277. The device of claim 270, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

278. The device of claim 270, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a presence of defects on the specimen.

279. The device of claim 278, wherein the defects comprise micro defects and macro defects.

280. The device of claim 278, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the third property further comprises a presence of defects on the bottom surface of the specimen.

281. The device of claim 280, wherein the defects comprise macro defects.

282. The device of claim 270, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a flatness measurement of the specimen.

283. The device of claim 270, further comprising processing the one or more output signals to determine a third property and a fourth property of the specimen, wherein the third property comprises a presence of defects on the specimen, and wherein the fourth property comprises a flatness measurement of the specimen.

284. The device of claim 270, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

285. The device of claim 284, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

286. The device of claim 270, wherein the stage and the measurement device are coupled to a process tool.

287. The device of claim 270, wherein the stage and the measurement device are coupled to a lithography tool.

288. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the portion of the semiconductor device, wherein the first property comprises a critical dimension of the portion of the semiconductor

device, and wherein the second property comprises overlay misregistration of the portion of the semiconductor device.

289. The method of claim 288, wherein the illumination system comprises a single energy source.

290. The method of claim 288, wherein the illumination system comprises more than one energy source.

291. The method of claim 288, wherein the detection system comprises a single energy sensitive device.

292. The method of claim 288, wherein the detection system comprises more than one energy sensitive devices.

293. The method of claim 288, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

294. The method of claim 288, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field

imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

295. The method of claim 288, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

296. The method of claim 288, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a presence of defects on the specimen.

297. The method of claim 296, wherein the defects comprise micro defects and macro defects.

298. The method of claim 296, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the third property further comprises a presence of defects on the bottom surface of the specimen.

299. The method of claim 298, wherein the defects comprise macro defects.

300. The method of claim 288, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a flatness measurement of the specimen.

301. The method of claim 288, further comprising processing the one or more output signals to determine a third property and a fourth property of the specimen, wherein the third property comprises a presence of defects on the specimen, and wherein the fourth property comprises a flatness measurement of the specimen.

302. The method of claim 288, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

303. The method of claim 302, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

304. The method of claim 288, wherein the stage and the measurement device are coupled to a process tool.

305. The method of claim 288, wherein the stage and the measurement device are coupled to a lithography tool.

306. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises overlay misregistration of the specimen.

307. The system of claim 306, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

308. The system of claim 306, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

309. The system of claim 306, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the illumination system of the first measurement device comprises the illumination system of the second measurement device.

310. The system of claim 306, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the detection system of the first measurement device comprises the detection system of the second measurement device.

311. The system of claim 306, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals during use, and wherein the third property comprises a presence of defects on the specimen.

312. The system of claim 311, wherein the defects comprise micro defects and macro defects.

313. The system of claim 311, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the third property further comprises a presence of defects on the bottom surface of the specimen.

314. The system of claim 313, wherein the defects comprise macro defects.

315. The system of claim 306, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals during use, and wherein the third property comprises a flatness measurement of the specimen.

316. The system of claim 306, wherein the remote controller computer is further configured to determine a third property and a fourth property of the specimen from the at least partially processed one or more output signals during use, wherein the third property comprises a presence of defects on the specimen, and wherein the fourth property comprises a flatness measurement of the specimen.

317. The system of claim 306, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

318. The system of claim 317, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

319. The system of claim 306, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

320. The system of claim 306, wherein the remote controller computer is coupled to a process tool.

321. The system of claim 320, wherein the process tool comprises a lithography tool.

322. The system of claim 320, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedback control technique during use.

323. The system of claim 320, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedforward control technique during use.

324. The system of claim 320, wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

325. The system of claim 324, wherein the remote controller computer is further configured to determine a relationship between the determined properties and at least one of the monitored parameters during use.

326. The system of claim 325, wherein the remote controller computer is further configured to alter the parameter of at least one of the instruments in response to the relationship during use.

327. The system of claim 320, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

328. The system of claim 327, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

329. The system of claim 327, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using an in situ control technique during use.

330. The system of claim 306, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to

move the specimen from the first process chamber to the second process chamber during use.

331. The system of claim 330, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during said moving.

332. The system of claim 306, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

333. The system of claim 306, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

334. The system of claim 333, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

335. The system of claim 306, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to the determined first or second property of the specimen during use.

336. The system of claim 306, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement

device in response to the determined first or second property using a feedback control technique during use.

337. The system of claim 306, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique during use.

338. The system of claim 306, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen.

339. The system of claim 338, wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

340. The system of claim 338, wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

341. The system of claim 338, wherein the database further comprises first and second properties of a plurality of specimens.

342. The system of claim 341, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

343. The system of claim 342, wherein the remote controller computer is further coupled to the plurality of measurement devices.

344. The system of claim 343, wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

345. The system of claim 343, wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

346. The system of claim 343, wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

347. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises overlay

misregistration of the specimen, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

348. The method of claim 347, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

349. The method of claim 347, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a bright field non-imaging device, a dark field non-imaging device, a bright field and dark

field non-imaging device, a coherence probe microscope, an interference microscope, and an optical profilometer.

350. The method of claim 347, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein an illumination system of the first measurement device comprises an illumination system of the second measurement device.

351. The method of claim 347, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein a detection system of the first measurement device comprises a detection system of the second measurement device.

352. The method of claim 347, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a presence of defects on the specimen.

353. The method of claim 352, wherein the defects comprise micro defects and macro defects.

354. The method of claim 352, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the third property further comprises a presence of defects on the bottom surface of the specimen.

355. The method of claim 354, wherein the defects comprise macro defects.

356. The method of claim 347, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property comprises a flatness measurement of the specimen.

357. The method of claim 347, further comprising processing the one or more output signals to determine a third property and a fourth property of the specimen, wherein the third property comprises a presence of defects on the specimen, and wherein the fourth property comprises a flatness measurement of the specimen.

358. The method of claim 347, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

359. The method of claim 358, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

360. The method of claim 347, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

361. The method of claim 347, wherein the remote controller computer is coupled to a process tool.

362. The method of claim 361, wherein the process tool comprises a lithography tool.

363. The method of claim 361, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property of the specimen using a feedback control technique.

364. The method of claim 361, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property of the specimen using a feedforward control technique.

365. The method of claim 361, further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

366. The method of claim 365, further comprising determining a relationship between the determined properties and at least one of the monitored parameters using the remote controller computer.

367. The method of claim 366, further comprising altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

368. The method of claim 361, wherein the illumination system and the detection system are coupled to a process chamber of the process tool, further comprising performing said directing and said detecting during a process step.

369. The method of claim 368, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

370. The method of claim 368, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property using an in situ control technique.

371. The method of claim 347, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage;

performing said directing and said detecting during said moving the specimen.

372. The method of claim 347, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

373. The method of claim 347, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

374. The method of claim 373, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

375. The method of claim 347, wherein the remote controller computer is coupled to the measurement device.

376. The method of claim 375, further comprising altering a sampling frequency of the measurement device using the remote controller computer in response to the determined first or second property of the specimen.

377. The method of claim 375, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to the determined first or second property using a feedback control technique.

378. The method of claim 375, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to the determined first or second property using a feedforward control technique.

379. The method of claim 347, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen.

380. The method of claim 379, further comprising calibrating the measurement device using the database and the remote controller computer.

381. The method of claim 379, further comprising monitoring output signals of the measurement device using the remote controller computer.

382. The method of claim 379, wherein the database further comprises first and second properties of a plurality of specimens.

383. The method of claim 382, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

384. The method of claim 383, further comprising calibrating the plurality of measurement devices using the remote controller computer.

385. The method of claim 383, further comprising monitoring output signals of the plurality of measurement devices using the remote controller computer.

386. The method of claim 347, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

387. The method of claim 386, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices using the remote controller computer in response to the determined first or second property of the specimen.

388. The method of claim 386, wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

389. The method of claim 388, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote controller computer in response to the determined first or second property of the specimen.

390. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a presence of defects on the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

391. The system of claim 390, wherein the stage is further configured to move laterally during use.

392. The system of claim 390, wherein the stage is further configured to move rotatably during use.

393. The system of claim 390, wherein the stage is further configured to move laterally and rotatably during use.

394. The system of claim 390, wherein the illumination system comprises a single energy source.

395. The system of claim 390, wherein the illumination system comprises more than one energy source.

396. The system of claim 390, wherein the detection system comprises a single energy sensitive device.

397. The system of claim 390, wherein the detection system comprises more than one energy sensitive device.

398. The system of claim 390, wherein the measurement device further comprises a non-imaging dark field device.

399. The system of claim 390, wherein the measurement device further comprises a non-imaging bright field device.

400. The system of claim 390, wherein the measurement device further comprises a non-imaging dark field and bright field device.

401. The system of claim 390, wherein the measurement device further comprises a double dark field device.

402. The system of claim 390, wherein the measurement device further comprises a dark field imaging device.

403. The system of claim 390, wherein the measurement device further comprises a bright field imaging device.

404. The system of claim 390, wherein the measurement device further comprises a dark field and bright field imaging device.

405. The system of claim 390, wherein the measurement device further comprises a scatterometer.

406. The system of claim 390, wherein the measurement device further comprises a spectroscopic scatterometer.

407. The system of claim 390, wherein the measurement device further comprises an ellipsometer.

408. The system of claim 390, wherein the measurement device further comprises a spectroscopic ellipsometer.

409. The system of claim 390, wherein the measurement device further comprises a reflectometer.

410. The system of claim 390, wherein the measurement device further comprises a spectroscopic reflectometer.

411. The system of claim 390, wherein the measurement device further comprises a dual beam spectrophotometer.

412. The system of claim 390, wherein the measurement device further comprises a beam profile ellipsometer.

413. The system of claim 390, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

414. The system of claim 390, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

415. The system of claim 390, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

416. The system of claim 390, wherein the defects comprise micro defects and macro defects.

417. The system of claim 390, wherein the defects comprise micro defects or macro defects.

418. The system of claim 390, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

419. The system of claim 390, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

420. The system of claim 390, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

421. The system of claim 420, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

422. The system of claim 390, wherein the system is further configured to determine at least two properties of the specimen substantially simultaneously during use.

423. The system of claim 390, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

424. The system of claim 390, wherein the system is coupled to a process tool.

425. The system of claim 390, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

426. The system of claim 390, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

427. The system of claim 390, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

428. The system of claim 390, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen from the system to the process tool during use.

429. The system of claim 390, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

430. The system of claim 390, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

431. The system of claim 390, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a

process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

432. The system of claim 390, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

433. The system of claim 390, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

434. The system of claim 390, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

435. The system of claim 390, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

436. The system of claim 390, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

437. The system of claim 390, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement

chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

438. The system of claim 390, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

439. The system of claim 438, wherein the processor is further configured to determine at least the two properties of the specimen during the process step.

440. The system of claim 439, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

441. The system of claim 439, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique during use.

442. The system of claim 390, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

443. The system of claim 390, wherein a process tool comprises a first process chamber and a second process chamber, wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use, and wherein the system is further configured to determine at least the two properties of

the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

444. The system of claim 390, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

445. The system of claim 390, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

446. The system of claim 445, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

447. The system of claim 390, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to the determined first or second property of the specimen during use.

448. The system of claim 390, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique during use.

449. The system of claim 390, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique during use.

450. The system of claim 390, wherein the processor is further configured to generate a database during use, and wherein the database comprises the determined first and second properties of the specimen.

451. The system of claim 390, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to calibrate the measurement device using the database during use.

452. The system of claim 390, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

453. The system of claim 390, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

454. The system of claim 453, wherein the first and second properties of the plurality of specimens are determined using the measurement device.

455. The system of claim 453, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

456. The system of claim 455, wherein the processor is further coupled to the plurality of measurement devices.

457. The system of claim 456, wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

458. The system of claim 456, wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

459. The system of claim 390, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

460. The system of claim 390, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

461. The system of claim 390, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

462. The system of claim 390, wherein the processor is further coupled to a process tool.

463. The system of claim 390, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedback control technique during use.

464. The system of claim 390, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedforward control technique during use.

465. The system of claim 390, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

466. The system of claim 465, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

467. The system of claim 466, wherein the processor is further configured to alter the parameter of at least one of the instruments in response to the relationship during use.

468. The system of claim 390, wherein the processor is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

469. The system of claim 390, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or

more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

470. The system of claim 469, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

471. The system of claim 469, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

472. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of defects on the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

473. The method of claim 472, further comprising laterally moving the stage during said directing energy and said detecting energy.

474. The method of claim 472, further comprising rotatably moving the stage during said directing energy and said detecting energy.

475. The method of claim 472, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

476. The method of claim 472, wherein the illumination system comprises a single energy source.

477. The method of claim 472, wherein the illumination system comprises more than one energy source.

478. The method of claim 472, wherein the detection system comprises a single energy sensitive device.

479. The method of claim 472, wherein the detection system comprises more than one energy sensitive device.

480. The method of claim 472, wherein the measurement device further comprises a non-imaging dark field device.

481. The method of claim 472, wherein the measurement device further comprises a non-imaging bright field device.

482. The method of claim 472, wherein the measurement device further comprises a non-imaging dark field and bright field device.

483. The method of claim 472, wherein the measurement device further comprises a double dark field device.

484. The method of claim 472, wherein the measurement device further comprises a dark field imaging device.

485. The method of claim 472, wherein the measurement device further comprises a bright field imaging device.

486. The method of claim 472, wherein the measurement device further comprises a dark field and bright field imaging device.

487. The method of claim 472, wherein the measurement device further comprises a scatterometer.

488. The method of claim 472, wherein the measurement device further comprises a spectroscopic scatterometer.

489. The method of claim 472, wherein the measurement device further comprises an ellipsometer.

490. The method of claim 472, wherein the measurement device further comprises a spectroscopic ellipsometer.

491. The method of claim 472, wherein the measurement device further comprises a reflectometer.

492. The method of claim 472, wherein the measurement device further comprises a spectroscopic reflectometer.

493. The method of claim 472, wherein the measurement device further comprises a dual beam spectrophotometer.

494. The method of claim 472, wherein the measurement device further comprises a beam profile ellipsometer.

495. The method of claim 472, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

496. The method of claim 472, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

497. The method of claim 472, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

498. The method of claim 472, wherein the defects comprise micro defects and macro defects.

499. The method of claim 472, wherein the defects comprise micro defects or macro defects.

500. The method of claim 472, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

501. The method of claim 472, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

502. The method of claim 472, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

503. The method of claim 502, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

504. The method of claim 472, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

505. The method of claim 472, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

506. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool.

507. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

508. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

509. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

510. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

511. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

512. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

513. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

514. The method of claim 472, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

515. The method of claim 472, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

516. The method of claim 472, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

517. The method of claim 472, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

518. The method of claim 472, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

519. The method of claim 472, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

520. The method of claim 472, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step, the method further comprising performing said directing and said detecting during the process step.

521. The method of claim 520, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

522. The method of claim 520, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

523. The method of claim 472, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

524. The method of claim 472, further comprising moving the specimen from a first process chamber to a second process chamber using the stage and performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

525. The method of claim 472, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

526. The method of claim 472, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

527. The method of claim 526, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

528. The method of claim 472, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

529. The method of claim 472, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique.

530. The method of claim 472, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique.

531. The method of claim 472, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

532. The method of claim 472, further comprising calibrating the measurement device using the database.

533. The method of claim 472, further comprising monitoring output signals generated by the measurement device using the database.

534. The method of claim 472, wherein the database further comprises first and second properties of a plurality of specimens.

535. The method of claim 534, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

536. The method of claim 535, further comprising calibrating the plurality of measurement devices using the database.

537. The method of claim 535, further comprising monitoring output signals generated by the plurality of measurement devices using the database.

538. The method of claim 472, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system

with a calibration standard and calibrating the measurement device with the stand alone system.

539. The method of claim 472, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

540. The method of claim 472, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

541. The method of claim 472, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

542. The method of claim 472, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

543. The method of claim 472, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

544. The method of claim 543, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

545. The method of claim 544, further comprising altering a parameter of at least one of the instruments in response to the relationship.

546. The method of claim 472, further comprising altering a parameter of one or more instruments coupled to each of a plurality of process tools in response to at least one of the determined properties of the specimen.

547. The method of claim 472, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

548. The method of claim 547, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

549. The method of claim 547, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

550. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of defects on the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

551. The method of claim 550, further comprising controlling the stage, wherein the stage is configured to support the specimen.

552. The method of claim 550, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

553. The method of claim 550, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

554. The method of claim 550, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

555. The method of claim 550, wherein the illumination system comprises a single energy source.

556. The method of claim 550, wherein the illumination system comprises more than one energy source.

557. The method of claim 550, wherein the detection system comprises a single energy sensitive device.

558. The method of claim 550, wherein the detection system comprises more than one energy sensitive devices.

559. The method of claim 550, wherein the measurement device further comprises a non-imaging dark field device.

560. The method of claim 550, wherein the measurement device further comprises a non-imaging bright field device.

561. The method of claim 550, wherein the measurement device further comprises a non-imaging dark field and bright field device.

562. The method of claim 550, wherein the measurement device further comprises a double dark field device.

563. The method of claim 550, wherein the measurement device further comprises a dark field imaging device.

564. The method of claim 550, wherein the measurement device further comprises a bright field imaging device.

565. The method of claim 550, wherein the measurement device further comprises a dark field and bright field imaging device.

566. The method of claim 550, wherein the measurement device further comprises a scatterometer.

567. The method of claim 550, wherein the measurement device further comprises a spectroscopic scatterometer.

568. The method of claim 550, wherein the measurement device further comprises an ellipsometer.

569. The method of claim 550, wherein the measurement device further comprises a spectroscopic ellipsometer.

570. The method of claim 550, wherein the measurement device further comprises a reflectometer.

571. The method of claim 550, wherein the measurement device further comprises a spectroscopic reflectometer.

572. The method of claim 550, wherein the measurement device further comprises a dual beam spectrophotometer.

573. The method of claim 550, wherein the measurement device further comprises a beam profile ellipsometer.

574. The method of claim 550, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

575. The method of claim 550, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

576. The method of claim 550, wherein the measurement device comprises non-optical components, and wherein controlling the detection system to detect energy comprises controlling the non-optical components to measure a non-optical characteristic of the surface of the specimen.

577. The method of claim 550, wherein the defects comprise micro defects and macro defects.

578. The method of claim 550, wherein the defects comprise micro defects or macro defects.

579. The method of claim 550, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

580. The method of claim 550, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

581. The method of claim 550, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

582. The method of claim 581, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

583. The method of claim 550, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

584. The method of claim 550, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially

simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

585. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool.

586. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

587. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

588. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

589. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

590. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

591. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

592. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

593. The method of claim 550, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

594. The method of claim 550, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

595. The method of claim 550, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

596. The method of claim 550, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

597. The method of claim 550, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

598. The method of claim 550, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, wherein the support device is configured to support the specimen during a process step.

599. The method of claim 598, further comprising controlling the illumination system and controlling the detection system during the process step.

600. The method of claim 598, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

601. The method of claim 598, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique.

602. The method of claim 550, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

603. The method of claim 602, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

604. The method of claim 550, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

605. The method of claim 550, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

606. The method of claim 605, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

607. The method of claim 550, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties.

608. The method of claim 550, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

609. The method of claim 550, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

610. The method of claim 550, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

611. The method of claim 610, further comprising calibrating the measurement device using the database.

612. The method of claim 610, further comprising monitoring output signals of measurement device using the database.

613. The method of claim 610, wherein the database further comprises first and second properties of a plurality of specimens.

614. The method of claim 613, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

615. The method of claim 613, further comprising calibrating the plurality of measurement devices using the database.

616. The method of claim 613, further comprising monitoring output signals of the plurality of measurement devices using the database.

617. The method of claim 550, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

618. The method of claim 550, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further

controlling the stand alone system to calibrate the system and at least the one additional system.

619. The method of claim 550, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

620. The method of claim 550, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

621. The method of claim 550, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

622. The method of claim 550, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

623. The method of claim 622, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

624. The method of claim 623, further comprising altering a parameter of at least one of the instruments in response to the relationship.

625. The method of claim 550, further comprising altering a parameter of one or more instruments coupled to each of a plurality of process tools in response to at least one of the determined properties of the specimen.

626. The method of claim 550, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

627. The method of claim 626, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

628. The method of claim 626, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

629. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of defects on the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

630. The device of claim 629, wherein the illumination system comprises a single energy source.

631. The device of claim 629, wherein the illumination system comprises more than one energy source.

632. The device of claim 629, wherein the detection system comprises a single energy sensitive device.

633. The device of claim 629, wherein the detection system comprises more than one energy sensitive devices.

634. The device of claim 629, wherein the measurement device further comprises a measurement device selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

635. The device of claim 629, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

636. The device of claim 629, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

637. The device of claim 629, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

638. The device of claim 629, wherein the defects comprise micro defects and macro defects.

639. The device of claim 629, wherein the defects comprise micro defects or macro defects.

640. The device of claim 629, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

641. The device of claim 629, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

642. The device of claim 629, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

643. The device of claim 642, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

644. The device of claim 629, wherein the stage and the measurement device are coupled to a process tool.

645. The device of claim 629, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

646. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of defects on the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

647. The method of claim 646, wherein the illumination system comprises a single energy source.

648. The method of claim 646, wherein the illumination system comprises more than one energy source.

649. The method of claim 646, wherein the detection system comprises a single energy sensitive device.

650. The method of claim 646, wherein the detection system comprises more than one energy sensitive devices.

651. The method of claim 646, wherein the measurement device further comprises a measurement device selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

652. The method of claim 646, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

653. The method of claim 646, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical

elements of the first measurement device comprise optical elements of the second measurement device.

654. The method of claim 646, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

655. The method of claim 646, wherein the defects comprise micro defects and macro defects.

656. The method of claim 646, wherein the defects comprise micro defects or macro defects.

657. The method of claim 646, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

658. The method of claim 646, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

659. The method of claim 646, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

660. The method of claim 659, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

661. The method of claim 646, wherein the stage and the measurement device are coupled to a process tool.

662. The method of claim 646, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

663. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or

more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a presence of defects on the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

664. The system of claim 663, wherein the measurement device further comprises a measurement device selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

665. The system of claim 663, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

666. The system of claim 663, wherein the illumination system and the detection system comprise non-optical components, and the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

667. The system of claim 663, wherein the defects comprise micro defects and macro defects.

668. The system of claim 663, wherein the defects comprise micro defects or macro defects.

669. The system of claim 663, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

670. The system of claim 663, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

671. The system of claim 663, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

672. The system of claim 671, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

673. The system of claim 663, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially

simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

674. The system of claim 663, wherein the stage and the measurement device are coupled to a process tool.

675. The system of claim 663, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

676. The system of claim 663, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

677. The system of claim 663, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

678. The system of claim 663, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

679. The system of claim 678, wherein the remote controller computer is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

680. The system of claim 679, wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

681. The system of claim 663, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

682. The system of claim 681, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

683. The system of claim 681, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

684. The system of claim 663, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

685. The system of claim 684, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during said moving.

686. The system of claim 663, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

687. The system of claim 663, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

688. The system of claim 687, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

689. The system of claim 663, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

690. The system of claim 663, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

691. The system of claim 663, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

692. The system of claim 663, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen.

693. The system of claim 692, wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

694. The system of claim 692, wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

695. The system of claim 692, wherein the database further comprises first and second properties of a plurality of specimens.

696. The system of claim 695, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

697. The system of claim 696, wherein the remote controller computer is further coupled to the plurality of measurement devices.

698. The system of claim 697, wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

699. The system of claim 697, wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

700. The system of claim 663, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

701. The system of claim 663, wherein the remote controller computer is further coupled to a plurality of process tools, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

702. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of defects on the specimen, and wherein the second property comprises a thin film characteristic of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

703. The method of claim 702, wherein the measurement device further comprises a measurement device selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

704. The method of claim 702, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging dark field device, a non-imaging bright field device, a non-imaging dark field and bright

field device, a double dark field device, a dark field imaging device, a bright field imaging device, a dark field and bright field imaging device, a scatterometer, a spectroscopic scatterometer, an ellipsometer, a spectroscopic ellipsometer, a reflectometer, a spectroscopic reflectometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

705. The method of claim 702, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

706. The method of claim 702, wherein the defects comprise micro defects and macro defects.

707. The method of claim 702, wherein the defects comprise micro defects or macro defects.

708. The method of claim 702, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

709. The method of claim 702, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

710. The method of claim 702, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

711. The method of claim 710, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

712. The method of claim 702, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

713. The method of claim 702, wherein the stage and the measurement device are coupled to a process tool.

714. The method of claim 702, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

715. The method of claim 702, wherein the stage and the measurement device are coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedback control technique.

716. The method of claim 702, wherein the stage and the measurement device are coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in

response to at least one of the determined properties of the specimen using a feedforward control technique.

717. The method of claim 702, wherein the stage and the measurement device are coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

718. The method of claim 717, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters using the remote controller computer.

719. The method of claim 718, further comprising altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

720. The method of claim 702, wherein the illumination system and the detection system are coupled to a process chamber of the process tool, the method further comprising performing said directing and said detecting during a process step.

721. The method of claim 720, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

722. The method of claim 720, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using an in situ control technique.

723. The method of claim 702, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage;

performing said directing and said detecting during said moving the specimen.

724. The method of claim 702, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

725. The method of claim 702, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

726. The method of claim 725, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

727. The method of claim 702, wherein the remote controller computer is coupled to the measurement device.

728. The method of claim 727, further comprising altering a sampling frequency of the measurement device using the remote controller computer in response to at least one of the determined properties of the specimen.

729. The method of claim 727, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

730. The method of claim 727, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedforward control technique.

731. The method of claim 702, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen.

732. The method of claim 731, further comprising calibrating the measurement device using the remote controller computer and the database.

733. The method of claim 731, further comprising monitoring output signals from the measurement device using the remote controller computer and the database.

734. The method of claim 731, wherein the database further comprises first and second properties of a plurality of specimens.

735. The method of claim 734, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

736. The method of claim 735, further comprising calibrating the plurality of measurement devices using the remote controller computer and the database.

737. The method of claim 735, further comprising monitoring the plurality of measurement devices using the remote controller computer and the database.

738. The method of claim 702, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

739. The method of claim 738, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices using the remote controller computer in response to at least one of the determined properties of the specimen.

740. The method of claim 738, wherein each of the plurality of measurement devices is coupled to one of a plurality of process tools.

741. The method of claim 740, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote controller computer in response to at least one of the determined properties of the specimen.

742. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a presence of defects on the specimen.

743. The system of claim 742, wherein the stage is further configured to move laterally during use.

744. The system of claim 742, wherein the stage is further configured to move rotatably during use.

745. The system of claim 742, wherein the stage is further configured to move laterally and rotatably during use.

746. The system of claim 742, wherein the illumination system comprises a single energy source.

747. The system of claim 742, wherein the illumination system comprises more than one energy source.

748. The system of claim 742, wherein the detection system comprises a single energy sensitive device.

749. The system of claim 742, wherein the detection system comprises more than one energy sensitive devices.

750. The system of claim 742, wherein the measurement device further comprises a non-imaging scatterometer.

751. The system of claim 742, wherein the measurement device further comprises a scatterometer.

752. The system of claim 742, wherein the measurement device further comprises a spectroscopic scatterometer.

753. The system of claim 742, wherein the measurement device further comprises a reflectometer.

754. The system of claim 742, wherein the measurement device further comprises a spectroscopic reflectometer.

755. The system of claim 742, wherein the measurement device further comprises a coherence probe microscope.

756. The system of claim 742, wherein the measurement device further comprises an ellipsometer.

757. The system of claim 742, wherein the measurement device further comprises a spectroscopic ellipsometer.

758. The system of claim 742, wherein the measurement device further comprises a bright field imaging device.

759. The system of claim 742, wherein the measurement device further comprises a dark field imaging device.

760. The system of claim 742, wherein the measurement device further comprises a bright field and dark field imaging device.

761. The system of claim 742, wherein the measurement device further comprises a non-imaging bright field device.

762. The system of claim 742, wherein the measurement device further comprises a non-imaging dark field device.

763. The system of claim 742, wherein the measurement device further comprises a non-imaging bright field and dark field device.

764. The system of claim 742, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

765. The system of claim 742, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

766. The system of claim 742, wherein the defects comprise micro defects and macro defects.

767. The system of claim 742, wherein the defects comprises micro defects or macro defects.

768. The system of claim 742, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

769. The system of claim 768, wherein the defects comprise macro defects.

770. The system of claim 742, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

771. The system of claim 770, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

772. The system of claim 742, wherein the system is further configured to determine at least two properties of the specimen substantially simultaneously during use.

773. The system of claim 742, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

774. The system of claim 742, wherein the system is coupled to a process tool.

775. The system of claim 742, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

776. The system of claim 742, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

777. The system of claim 742, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

778. The system of claim 742, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

779. The system of claim 742, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

780. The system of claim 742, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

781. The system of claim 742, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

782. The system of claim 742, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

783. The system of claim 742, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

784. The system of claim 742, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within the process tool.

785. The system of claim 742, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement

chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

786. The system of claim 742, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

787. The system of claim 742, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

788. The system of claim 787, wherein the processor is further configured to determine at least the two properties of the specimen during the process step.

789. The system of claim 788, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

790. The system of claim 788, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique during use.

791. The system of claim 742, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

792. The system of claim 742, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the system is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

793. The system of claim 742, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

794. The system of claim 742, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

795. The system of claim 794, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

796. The system of claim 742, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to the determined first or second property of the specimen during use.

797. The system of claim 742, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique during use.

798. The system of claim 742, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique during use.

799. The system of claim 742, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen.

800. The system of claim 799, wherein the processor is further configured to calibrate the measurement device using the database during use.

801. The system of claim 799, wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

802. The system of claim 799, wherein the database further comprises first and second properties of a plurality of specimens.

803. The system of claim 802, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

804. The system of claim 803, wherein the processor is further coupled to the plurality of measurement devices.

805. The system of claim 804, wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

806. The system of claim 804, wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

807. The system of claim 742, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

808. The system of claim 742, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

809. The system of claim 742, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

810. The system of claim 742, wherein the processor is further coupled to a process tool.

811. The system of claim 742, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more

instruments coupled to the process tool in response to the determined first or second property using a feedback control technique during use.

812. The system of claim 742, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedforward control technique during use.

813. The system of claim 742, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

814. The system of claim 813, wherein the processor is further configured to determine a relationship between the determined properties and at least one of the monitored parameter during use.

815. The system of claim 814, wherein the processor is further configured to alter the parameter of at least one of the instruments in response to the relationship during use.

816. The system of claim 742, wherein the processor is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

817. The system of claim 742, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

818. The system of claim 817, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

819. The system of claim 817, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

820. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a presence of defects on the specimen.

821. The method of claim 820, further comprising laterally moving the stage during said directing energy and said detecting energy.

822. The method of claim 820, further comprising rotatably moving the stage during said directing energy and said detecting energy.

823. The method of claim 820, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

824. The method of claim 820, wherein the illumination system comprises a single energy source.

825. The method of claim 820, wherein the illumination system comprises more than one energy source.

826. The method of claim 820, wherein the detection system comprises a single energy sensitive device.

827. The method of claim 820, wherein the detection system comprises more than one energy sensitive devices.

828. The method of claim 820, wherein the measurement device further comprises a non-imaging scatterometer.

829. The method of claim 820, wherein the measurement device further comprises a scatterometer.

830. The method of claim 820, wherein the measurement device further comprises a spectroscopic scatterometer.

831. The method of claim 820, wherein the measurement device further comprises a reflectometer.

832. The method of claim 820, wherein the measurement device further comprises a spectroscopic reflectometer.

833. The method of claim 820, wherein the measurement device further comprises a coherence probe microscope.

834. The method of claim 820, wherein the measurement device further comprises an ellipsometer.

835. The method of claim 820, wherein the measurement device further comprises a spectroscopic ellipsometer.

836. The method of claim 820, wherein the measurement device further comprises a bright field imaging device.

837. The method of claim 820, wherein the measurement device further comprises a dark field imaging device.

838. The method of claim 820, wherein the measurement device further comprises a bright field and dark field imaging device.

839. The method of claim 820, wherein the measurement device further comprises a non-imaging bright field device.

840. The method of claim 820, wherein the measurement device further comprises a non-imaging dark field device.

841. The method of claim 820, wherein the measurement device further comprises and a non-imaging bright field and dark field device.

842. The method of claim 820, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

843. The method of claim 820, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

844. The method of claim 820, wherein the defects comprise micro defects and macro defects.

845. The method of claim 820, wherein the defects comprises micro defects or macro defects.

846. The method of claim 820, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

847. The method of claim 846, wherein the defects comprise macro defects.

848. The method of claim 820, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

849. The method of claim 848, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

850. The method of claim 820, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

851. The method of claim 820, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

852. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool.

853. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

854. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

855. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

856. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

857. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

858. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

859. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

860. The method of claim 820, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

861. The method of claim 820, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

862. The method of claim 820, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within the process tool.

863. The method of claim 820, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

864. The method of claim 820, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

865. The method of claim 820, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process

chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

866. The method of claim 865, further comprising performing said directing and said detecting during the process step.

867. The method of claim 866, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

868. The method of claim 866, further comprising altering a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique.

869. The method of claim 820, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

870. The method of claim 869, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

871. The method of claim 820, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

872. The method of claim 820, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

873. The method of claim 872, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

874. The method of claim 820, further comprising altering a sampling frequency of the measurement device in response to the determined first or second property of the specimen.

875. The method of claim 820, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique.

876. The method of claim 820, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique.

877. The method of claim 820, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

878. The method of claim 877, further comprising calibrating the measurement device using the database.

879. The method of claim 877, further comprising monitoring output signals of the measurement device using the database.

880. The method of claim 877, wherein the database further comprises first and second properties of a plurality of specimens.

881. The method of claim 880, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

882. The method of claim 881, further comprising calibrating the plurality of measurement devices using the database.

883. The method of claim 881, further comprising monitoring output signals of the plurality of measurement devices using the database.

884. The method of claim 820, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

885. The method of claim 820, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

886. The method of claim 820, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

887. The method of claim 820, further comprising altering a parameter of one or more instrument coupled to a process tool in response to the determined first or second property of the specimen using a feedback control technique.

888. The method of claim 820, further comprising altering a parameter of one or more instrument coupled to a process tool in response to the determined first or second property of the specimen using a feedforward control technique.

889. The method of claim 820, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

890. The method of claim 889, further comprising determining a relationship between the determined properties and at least one of the monitored parameters.

891. The method of claim 890, further comprising altering the parameter of at least one of the instruments in response to the relationship.

892. The method of claim 820, further comprising altering a parameter of one or more instruments coupled to each of a plurality of process tools in response to the determined first or second property of the specimen.

893. The method of claim 820, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

894. The method of claim 893, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

895. The method of claim 893, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

896. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a presence of defects on the specimen.

897. The method of claim 896, further comprising controlling the stage, wherein the stage is configured to support the specimen.

898. The method of claim 896, further comprising controlling the stage to move laterally during said directing energy and said detecting energy.

899. The method of claim 896, further comprising controlling the stage to move rotatably during said directing energy and said detecting energy.

900. The method of claim 896, further comprising controlling the stage to move laterally and rotatably during said directing energy and said detecting energy.

901. The method of claim 896, wherein the illumination system comprises a single energy source.

902. The method of claim 896, wherein the illumination system comprises more than one energy source.

903. The method of claim 896, wherein the detection system comprises a single energy sensitive device.

904. The method of claim 896, wherein the detection system comprises more than one energy sensitive devices.

905. The method of claim 896, wherein the measurement device further comprises a non-imaging scatterometer.

906. The method of claim 896, wherein the measurement device further comprises a scatterometer.

907. The method of claim 896, wherein the measurement device further comprises a spectroscopic scatterometer.

908. The method of claim 896, wherein the measurement device further comprises a reflectometer.

909. The method of claim 896, wherein the measurement device further comprises a spectroscopic reflectometer.

910. The method of claim 896, wherein the measurement device further comprises a coherence probe microscope.

911. The method of claim 896, wherein the measurement device further comprises an ellipsometer.

912. The method of claim 896, wherein the measurement device further comprises a spectroscopic ellipsometer.

913. The method of claim 896, wherein the measurement device further comprises a bright field imaging device.

914. The method of claim 896, wherein the measurement device further comprises a dark field imaging device.

915. The method of claim 896, wherein the measurement device further comprises a bright field and dark field imaging device.

916. The method of claim 896, wherein the measurement device further comprises a non-imaging bright field device.

917. The method of claim 896, wherein the measurement device further comprises a non-imaging dark field device.

918. The method of claim 896, wherein the measurement device further comprises and a non-imaging bright field and dark field device.

919. The method of claim 896, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

920. The method of claim 896, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

921. The method of claim 896, wherein the defects comprise micro defects and macro defects.

922. The method of claim 896, wherein the defects comprises micro defects or macro defects.

923. The method of claim 896, further comprising:

controlling the illumination system to direct energy toward a bottom surface of the specimen; and

controlling the detection system to detect energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

924. The method of claim 923, wherein the defects comprise macro defects.

925. The method of claim 896, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

926. The method of claim 925, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

927. The method of claim 896, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

928. The method of claim 896, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

929. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool.

930. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

931. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

932. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

933. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

934. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

935. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

936. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

937. The method of claim 896, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

938. The method of claim 896, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

939. The method of claim 896, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

940. The method of claim 896, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

941. The method of claim 896, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

942. The method of claim 896, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

943. The method of claim 942, further comprising controlling the illumination system and controlling the detection system during the process step.

944. The method of claim 943, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

945. The method of claim 943, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique.

946. The method of claim 896, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

947. The method of claim 946, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

948. The method of claim 896, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

949. The method of claim 896, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

950. The method of claim 949, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

951. The method of claim 896, further comprising altering a sampling frequency of the measurement device in response to the determined first or second property of the specimen.

952. The method of claim 896, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique.

953. The method of claim 896, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique.

954. The method of claim 896, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

955. The method of claim 954, further comprising calibrating the measurement device using the database.

956. The method of claim 954, further comprising monitoring output signals of the measurement device using the database.

957. The method of claim 954, wherein the database further comprises first and second properties of a plurality of specimens.

958. The method of claim 957, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

959. The method of claim 958, further comprising calibrating the plurality of measurement devices using the database.

960. The method of claim 958, further comprising monitoring output signals of the plurality of measurement devices using the database.

961. The method of claim 896, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

962. The method of claim 896, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

963. The method of claim 896, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

964. The method of claim 896, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedback control technique.

965. The method of claim 896, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedforward control technique.

966. The method of claim 896, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

967. The method of claim 966, further comprising determining a relationship between the determined properties and at least one of the monitored parameters.

968. The method of claim 967, further comprising altering a parameter of one or more of the instruments in response to the relationship.

969. The method of claim 896, further comprising altering a parameter of one or more instruments coupled to each of a plurality of process tools in response to the determined first or second property of the specimen.

970. The method of claim 896, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

971. The method of claim 970, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

972. The method of claim 970, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

973. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the portion of the specimen, and wherein the second property comprises a presence of defects on the portion of the specimen.

974. The device of claim 973, wherein the illumination system comprises a single energy source.

975. The device of claim 973, wherein the illumination system comprises more than one energy source.

976. The device of claim 973, wherein the detection system comprises a single energy sensitive device.

977. The device of claim 973, wherein the detection system comprises more than one energy sensitive devices.

978. The device of claim 973, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

979. The device of claim 973, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

980. The device of claim 973, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical

elements of the first measurement device comprise optical elements of the second measurement device.

981. The device of claim 973, wherein the defects comprise micro defects and macro defects.

982. The device of claim 973, wherein the defects comprises micro defects or macro defects.

983. The device of claim 973, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

984. The device of claim 983, wherein the defects comprise macro defects.

985. The device of claim 973, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

986. The device of claim 973, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

987. The device of claim 973, wherein the stage and the measurement device are coupled to a process tool.

988. The device of claim 973, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

989. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a presence of defects on the portion of the specimen.

990. The method of claim 989, wherein the illumination system comprises a single energy source.

991. The method of claim 989, wherein the illumination system comprises more than one energy source.

992. The method of claim 989, wherein the detection system comprises a single energy sensitive device.

993. The method of claim 989, wherein the detection system comprises more than one energy sensitive devices.

994. The method of claim 989, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

995. The method of claim 989, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

996. The method of claim 989, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

997. The method of claim 989, wherein the defects comprise micro defects and macro defects.

998. The method of claim 989, wherein the defects comprises micro defects or macro defects.

999. The method of claim 989, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

1000. The method of claim 999, wherein the defects comprise macro defects.

1001. The method of claim 989, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1002. The method of claim 1001, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1003. The method of claim 989, wherein the stage and the measurement device are coupled to a process tool.

1004. The method of claim 989, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool and an etch tool.

1005. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a presence of defects on the specimen.

1006. The system of claim 1005, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a spectroscopic ellipsometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

1007. The system of claim 1005, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

1008. The system of claim 1005, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical

elements of the first measurement device comprise optical elements of the second measurement device.

1009. The system of claim 1005, wherein the defects comprise micro defects and macro defects.

1010. The system of claim 1005, wherein the defects comprises micro defects or macro defects.

1011. The system of claim 1005, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

1012. The system of claim 1011, wherein the defects comprise macro defects.

1013. The system of claim 1005, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1014. The system of claim 1013, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1015. The system of claim 1005, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1016. The system of claim 1005, wherein the remote controller computer is coupled to a process tool.

1017. The system of claim 1005, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from a group consisting of a lithography tool, an etch tool, and a deposition tool.

1018. The system of claim 1005, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedback control technique during use.

1019. The system of claim 1005, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedforward control technique during use.

1020. The system of claim 1005, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instrument coupled to the process tool during use.

1021. The system of claim 1005, wherein the remote controller computer is coupled to a process tool, wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use, and wherein the remote controller computer is further configured to determine a relationship between the determined properties and at least one of the monitored parameters during use.

1022. The system of claim 1005, wherein the remote controller computer is coupled to a process tool, wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use, wherein the remote controller computer is further configured to determine a relationship between the determined properties and the at least one of the monitored parameters during use, and wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

1023. The system of claim 1005, wherein the system and the remote controller computer are coupled to a process tool, wherein the process tool is configured to perform a step of a process, wherein the illumination system is further configured to direct energy toward the surface of the specimen during the process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

1024. The system of claim 1023, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

1025. The system of claim 1023, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using an in situ control technique during use.

1026. The system of claim 1005, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

1027. The system of claim 1026, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during said moving.

1028. The system of claim 1005, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

1029. The system of claim 1005, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

1030. The system of claim 1029, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

1031. The system of claim 1005, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to the determined first or second property of the specimen during use.

1032. The system of claim 1005, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique during use.

1033. The system of claim 1005, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique during use.

1034. The system of claim 1005, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen.

1035. The system of claim 1034, wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

1036. The system of claim 1034, wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

1037. The system of claim 1034, wherein the database further comprises first and second properties of a plurality of specimens.

1038. The system of claim 1037, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

1039. The system of claim 1038, wherein the remote controller computer is further coupled to the plurality of measurement devices.

1040. The system of claim 1039, wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

1041. The system of claim 1039, wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

1042. The system of claim 1005, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

1043. The system of claim 1042, wherein the remote controller computer is further coupled to at least one of the plurality of process tools, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

1044. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a presence of defects on the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1045. The method of claim 1044, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic

scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

1046. The method of claim 1044, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, and a non-imaging bright field and dark field device.

1047. The method of claim 1044, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1048. The method of claim 1044, wherein the defects comprise micro defects and macro defects.

1049. The method of claim 1044, wherein the defects comprises micro defects or macro defects.

1050. The method of claim 1044, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

1051. The method of claim 1050, wherein the defects comprise macro defects.

1052. The method of claim 1044, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1053. The method of claim 1052, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1054. The method of claim 1044, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1055. The method of claim 1044, wherein the remote controller computer is coupled to a process tool.

1056. The method of claim 1044, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1057. The method of claim 1044, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property of the specimen using a feedback control technique.

1058. The method of claim 1044, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property of the specimen using a feedforward control technique.

1059. The method of claim 1044, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

1060. The method of claim 1059, further comprising determining a relationship between the determined properties and the monitored parameters using the remote controller computer.

1061. The method of claim 1060, further comprising altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

1062. The method of claim 1044, wherein the illumination system and the detection system are coupled to a process chamber of the process tool, the method further comprising performing said directing and said detecting during a process step.

1063. The method of claim 1062, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

1064. The method of claim 1062, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property using an in situ control technique.

1065. The method of claim 1044, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage;

performing said directing and said detecting during said moving the specimen.

1066. The method of claim 1044, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

1067. The method of claim 1044, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

1068. The method of claim 1067, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1069. The method of claim 1044, wherein the remote controller computer is coupled to the measurement device.

1070. The method of claim 1069, further comprising altering a sampling frequency of the measurement device using the remote controller computer in response to the determined first or second property of the specimen.

1071. The method of claim 1069, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to the determined first or second property using a feedback control technique.

1072. The method of claim 1069, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to the determined first or second property using a feedforward control technique.

1073. The method of claim 1044, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen.

1074. The method of claim 1073, further comprising calibrating the measurement device using the database and the remote controller computer.

1075. The method of claim 1073, further comprising monitoring output signals of the measurement device using the database and the remote controller computer.

1076. The method of claim 1073, wherein the database further comprises first and second properties of a plurality of specimens.

1077. The method of claim 1076, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

1078. The method of claim 1077, further comprising calibrating the plurality of measurement devices using the database and the remote controller computer.

1079. The method of claim 1077, further comprising monitoring output signals of the plurality of measurement devices using the database and the remote controller computer.

1080. The method of claim 1044, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

1081. The method of claim 1080, wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

1082. The method of claim 1081, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote controller computer in response to the determined first or second property of the specimen.

1083. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

1084. The system of claim 1083, wherein the stage is further configured to move laterally during use.

1085. The system of claim 1083, wherein the stage is further configured to move rotatably during use.

1086. The system of claim 1083, wherein the stage is further configured to move laterally and rotatably during use.

1087. The system of claim 1083, wherein the illumination system comprises a single energy source.

1088. The system of claim 1083, wherein the illumination system comprises more than one energy source.

1089. The system of claim 1083, wherein the detection system comprises a single energy sensitive device.

1090. The system of claim 1083, wherein the detection system comprises more than one energy sensitive devices.

1091. The system of claim 1083, wherein the measurement device further comprises a non-imaging scatterometer.

1092. The system of claim 1083, wherein the measurement device further comprises a scatterometer.

1093. The system of claim 1083, wherein the measurement device further comprises a spectroscopic scatterometer.

1094. The system of claim 1083, wherein the measurement device further comprises a reflectometer.

1095. The system of claim 1083, wherein the measurement device further comprises a spectroscopic reflectometer.

1096. The system of claim 1083, wherein the measurement device further comprises a coherence probe microscope.

1097. The system of claim 1083, wherein the measurement device further comprises a bright field imaging device.

1098. The system of claim 1083, wherein the measurement device further comprises a dark field imaging device.

1099. The system of claim 1083, wherein the measurement device further comprises a bright field and dark field imaging device.

1100. The system of claim 1083, wherein the measurement device further comprises an ellipsometer.

1101. The system of claim 1083, wherein the measurement device further comprises a spectroscopic ellipsometer.

1102. The system of claim 1083, wherein the measurement device further comprises a dual beam spectrophotometer.

1103. The system of claim 1083, wherein the measurement device further comprises a beam profile ellipsometer.

1104. The system of claim 1083, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a

spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grating X-ray reflectometer.

1105. The system of claim 1083, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1106. The system of claim 1083, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

1107. The system of claim 1083, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1108. The system of claim 1083, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the system is coupled to an atomic layer deposition tool.

1109. The system of claim 1083, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1110. The system of claim 1109, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1111. The system of claim 1083, wherein the system is further configured to determine at least the two properties of the specimen substantially simultaneously during use.

1112. The system of claim 1083, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1113. The system of claim 1083, wherein the system is coupled to a process tool.

1114. The system of claim 1083, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

1115. The system of claim 1083, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

1116. The system of claim 1083, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

1117. The system of claim 1083, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

1118. The system of claim 1083, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

1119. The system of claim 1083, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1120. The system of claim 1083, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1121. The system of claim 1083, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1122. The system of claim 1083, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1123. The system of claim 1083, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

1124. The system of claim 1083, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

1125. The system of claim 1083, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of is process tool.

1126. The system of claim 1083, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

1127. The system of claim 1126, wherein the processor is further configured to determine at least the two properties of the specimen during the process step.

1128. The system of claim 1127, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

1129. The system of claim 1127, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the

process tool in response to the determined properties using an in situ control technique during use.

1130. The system of claim 1083, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

1131. The system of claim 1130, wherein the system is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

1132. The system of claim 1083, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

1133. The system of claim 1083, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

1134. The system of claim 1133, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

1135. The system of claim 1083, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to the determined first or second property of the specimen during use.

1136. The system of claim 1083, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique during use.

1137. The system of claim 1083, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique during use.

1138. The system of claim 1083, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen.

1139. The system of claim 1138, wherein the processor is further configured to calibrate the measurement device using the database during use.

1140. The system of claim 1139, wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

1141. The system of claim 1139, wherein the database further comprises first and second properties of a plurality of specimens.

1142. The system of claim 1141, wherein the first and second properties of the plurality of specimens are determined using the measurement device.

1143. The system of claim 1141, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

1144. The system of claim 1143, wherein the processor is further coupled to the plurality of measurement devices.

1145. The system of claim 1144, wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

1146. The system of claim 1144, wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

1147. The system of claim 1083, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

1148. The system of claim 1083, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

1149. The system of claim 1083, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1150. The system of claim 1083, wherein the processor is further coupled to a process tool.

1151. The system of claim 1150, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedback control technique during use.

1152. The system of claim 1150, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedforward control technique during use.

1153. The system of claim 1150, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

1154. The system of claim 1153, wherein the processor is further configured to determine a relationship between the determined properties and the monitored parameters during use.

1155. The system of claim 1154, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the relationship during use.

1156. The system of claim 1083, wherein the processor is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

1157. The system of claim 1083, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local

processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

1158. The system of claim 1157, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

1159. The system of claim 1157, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

1160. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

1161. The method of claim 1160, further comprising laterally moving the stage during said directing energy and said detecting energy.

1162. The method of claim 1160, further comprising rotatably moving the stage during said directing energy and said detecting energy.

1163. The method of claim 1160, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

1164. The method of claim 1160, wherein the illumination system comprises a single energy source.

1165. The method of claim 1160, wherein the illumination system comprises more than one energy source.

1166. The method of claim 1160, wherein the detection system comprises a single energy sensitive device.

1167. The method of claim 1160, wherein the detection system comprises more than one energy sensitive devices.

1168. The method of claim 1160, wherein the measurement device further comprises a non-imaging scatterometer.

1169. The method of claim 1160, wherein the measurement device further comprises a scatterometer.

1170. The method of claim 1160, wherein the measurement device further comprises a spectroscopic scatterometer.

1171. The method of claim 1160, wherein the measurement device further comprises a reflectometer.

1172. The method of claim 1160, wherein the measurement device further comprises a spectroscopic reflectometer.

1173. The method of claim 1160, wherein the measurement device further comprises a coherence probe microscope.

1174. The method of claim 1160, wherein the measurement device further comprises a bright field imaging device.

1175. The method of claim 1160, wherein the measurement device further comprises a dark field imaging device.

1176. The method of claim 1160, wherein the measurement device further comprises a bright field and dark field imaging device.

1177. The method of claim 1160, wherein the measurement device further comprises an ellipsometer.

1178. The method of claim 1160, wherein the measurement device further comprises a spectroscopic ellipsometer.

1179. The method of claim 1160, wherein the measurement device further comprises a dual beam spectrophotometer.

1180. The method of claim 1160, wherein the measurement device further comprises a beam profile ellipsometer.

1181. The method of claim 1160, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grating X-ray reflectometer.

1182. The method of claim 1160, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1183. The method of claim 1160, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

1184. The method of claim 1160, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1185. The method of claim 1160, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1186. The method of claim 1160, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1187. The method of claim 1186, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1188. The method of claim 1160, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

1189. The method of claim 1160, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1190. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool.

1191. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

1192. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

1193. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1194. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

1195. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

1196. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

1197. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured

to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1198. The method of claim 1160, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1199. The method of claim 1160, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1200. The method of claim 1160, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within the process tool.

1201. The method of claim 1160, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

1202. The method of claim 1160, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

1203. The method of claim 1160, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

1204. The method of claim 1203, further comprising performing said directing and said detecting during the process step.

1205. The method of claim 1204, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

1206. The method of claim 1204, further comprising altering a parameter of one or more instrument coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

1207. The method of claim 1160, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

1208. The method of claim 1207, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

1209. The method of claim 1160, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

1210. The method of claim 1160, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

1211. The method of claim 1210, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1212. The method of claim 1160, further comprising altering a sampling frequency of the measurement device in response to the determined first or second properties of the specimen.

1213. The method of claim 1160, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique.

1214. The method of claim 1160, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique.

1215. The method of claim 1160, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

1216. The method of claim 1215, further comprising calibrating the measurement device using the database.

1217. The method of claim 1215, further comprising monitoring output signals of the measurement device using the database.

1218. The method of claim 1215, wherein the database further comprises first and second properties of a plurality of specimens.

1219. The method of claim 1218, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

1220. The method of claim 1219, further comprising calibrating the plurality of measurement devices using the database.

1221. The method of claim 1219, further comprising monitoring output signals of the plurality of measurement devices using the database.

1222. The method of claim 1160, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

1223. The method of claim 1160, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

1224. The method of claim 1160, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1225. The method of claim 1160, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedback control technique.

1226. The method of claim 1160, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedforward control technique.

1227. The method of claim 1160, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

1228. The method of claim 1227, further comprising determining a relationship between the determined properties and the monitored parameters.

1229. The method of claim 1228, further comprising altering a parameter of at least one of the instruments in response to the relationship.

1230. The method of claim 1160, further comprising altering a parameter of one or more instrument coupled to a plurality of process tools in response to the determined first or second property of the specimen.

1231. The method of claim 1160, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1232. The method of claim 1231, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

1233. The method of claim 1231, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

1234. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

1235. The method of claim 1234, further comprising controlling the stage, wherein the stage is configured to support the specimen.

1236. The method of claim 1234, further comprising controlling the stage to move laterally during said directing energy and said detecting energy.

1237. The method of claim 1234, further comprising controlling the stage to move rotatably during said directing energy and said detecting energy.

1238. The method of claim 1234, further comprising controlling the stage to move laterally and rotatably during said directing energy and said detecting energy.

1239. The method of claim 1234, wherein the illumination system comprises a single energy source.

1240. The method of claim 1234, wherein the illumination system comprises more than one energy source.

1241. The method of claim 1234, wherein the detection system comprises a single energy sensitive device.

1242. The method of claim 1234, wherein the detection system comprises more than one energy sensitive devices.

1243. The method of claim 1234, wherein the measurement device further comprises a non-imaging scatterometer.

1244. The method of claim 1234, wherein the measurement device further comprises a scatterometer.

1245. The method of claim 1234, wherein the measurement device further comprises a spectroscopic scatterometer.

1246. The method of claim 1234, wherein the measurement device further comprises a reflectometer.

1247. The method of claim 1234, wherein the measurement device further comprises a spectroscopic reflectometer.

1248. The method of claim 1234, wherein the measurement device further comprises a coherence probe microscope.

1249. The method of claim 1234, wherein the measurement device further comprises a bright field imaging device.

1250. The method of claim 1234, wherein the measurement device further comprises a dark field imaging device.

1251. The method of claim 1234, wherein the measurement device further comprises a bright field and dark field imaging device.

1252. The method of claim 1234, wherein the measurement device further comprises an ellipsometer.

1253. The method of claim 1234, wherein the measurement device further comprises a spectroscopic ellipsometer.

1254. The method of claim 1234, wherein the measurement device further comprises a dual beam spectrophotometer.

1255. The method of claim 1234, wherein the measurement device further comprises a beam profile ellipsometer.

1256. The method of claim 1234, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1257. The method of claim 1234, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1258. The method of claim 1234, wherein the measurement device further comprises non-optical components, and wherein controlling the detection system to detect energy comprises controlling the non-optical components to measure a non-optical characteristic of the surface of the specimen.

1259. The method of claim 1234, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1260. The method of claim 1234, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the system is coupled to an atomic layer deposition tool.

1261. The method of claim 1234, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1262. The method of claim 1261, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1263. The method of claim 1234, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

1264. The method of claim 1234, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially

simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1265. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool.

1266. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

1267. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

1268. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1269. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

1270. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

1271. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

1272. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1273. The method of claim 1234, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1274. The method of claim 1234, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1275. The method of claim 1234, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within the process tool.

1276. The method of claim 1234, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of the process tool.

1277. The method of claim 1234, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of the process tool.

1278. The method of claim 1234, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

1279. The method of claim 1278, further comprising controlling the illumination system and controlling the detection system during the process step.

1280. The method of claim 1279, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

1281. The method of claim 1279, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique.

1282. The method of claim 1234, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

1283. The method of claim 1282, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

1284. The method of claim 1234, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

1285. The method of claim 1234, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

1286. The method of claim 1285, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1287. The method of claim 1234, further comprising altering a sampling frequency of the measurement device in response to the determined first or second property of the specimen.

1288. The method of claim 1234, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique.

1289. The method of claim 1234, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique.

1290. The method of claim 1234, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

1291. The method of claim 1290, further comprising calibrating the measurement device using the database.

1292. The method of claim 1290, further comprising monitoring output signals of the measurement device using the database.

1293. The method of claim 1290, wherein the database further comprises first and second properties of a plurality of specimens.

1294. The method of claim 1293, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

1295. The method of claim 1294, further comprising calibrating the plurality of measurement devices using the database.

1296. The method of claim 1294, further comprising monitoring output signals of the plurality of measurement devices using the database.

1297. The method of claim 1234, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

1298. The method of claim 1234, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

1299. The method of claim 1234, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1300. The method of claim 1234, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedback control technique.

1301. The method of claim 1234, further comprising altering a parameter of one or more instruments coupled to a process tool in response to the determined first or second property of the specimen using a feedforward control technique.

1302. The method of claim 1234, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

1303. The method of claim 1302, further comprising determining a relationship between the determined properties and the monitored parameters.

1304. The method of claim 1303, further comprising altering a parameter of at least one of the instruments in response to the relationship.

1305. The method of claim 1234, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to the determined first or second property of the specimen.

1306. The method of claim 1234, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1307. The method of claim 1306, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

1308. The method of claim 1306, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

1309. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

1310. The device of claim 1309, wherein the illumination system comprises a single energy source.

1311. The device of claim 1309, wherein the illumination system comprises more than one energy source.

1312. The device of claim 1309, wherein the detection system comprises a single energy sensitive device.

1313. The device of claim 1309, wherein the detection system comprises more than one energy sensitive devices.

1314. The device of claim 1309, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam

spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1315. The device of claim 1309, wherein the measurement device comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1316. The device of claim 1309, wherein the measurement device comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1317. The device of claim 1309, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

1318. The device of claim 1309, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1319. The device of claim 1309, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1320. The device of claim 1309, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1321. The device of claim 1320, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1322. The device of claim 1309, wherein the stage and the measurement device are coupled to a process tool.

1323. The device of claim 1309, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1324. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

1325. The method of claim 1324, wherein the illumination system comprises a single energy source.

1326. The method of claim 1324, wherein the illumination system comprises more than one energy source.

1327. The method of claim 1324, wherein the detection system comprises a single energy sensitive device.

1328. The method of claim 1324, wherein the detection system comprises more than one energy sensitive devices.

1329. The method of claim 1324, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1330. The method of claim 1324, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1331. The method of claim 1324, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1332. The method of claim 1324, wherein the measurement device further comprises non-optical components, and wherein measuring a non-optical characteristic of the surface of the specimen.

1333. The method of claim 1324, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1334. The method of claim 1324, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1335. The method of claim 1324, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is

selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1336. The method of claim 1335, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1337. The method of claim 1324, wherein the stage and the measurement device are coupled to a process tool.

1338. The method of claim 1324, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1339. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a thin film characteristic of the specimen.

1340. The system of claim 1339, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1341. The system of claim 1339, wherein the measurement device comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1342. The system of claim 1339, wherein the measurement device comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1343. The system of claim 1339, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

1344. The system of claim 1339, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1345. The system of claim 1339, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the system is coupled to an atomic layer deposition tool.

1346. The system of claim 1339, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially processed one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1347. The system of claim 1339, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1348. The system of claim 1339, wherein the remote controller computer is coupled to a process tool.

1349. The system of claim 1339, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from a group consisting of a lithography tool, an etch tool, and a deposition tool.

1350. The system of claim 1339, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedback control technique during use.

1351. The system of claim 1339, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using a feedforward control technique during use.

1352. The system of claim 1339, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

1353. The system of claim 1352, wherein the remote controller computer is further configured to determine a relationship between the determined properties and the monitored parameters during use.

1354. The system of claim 1353, wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

1355. The system of claim 1339, wherein the system is coupled to a process tool, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

1356. The system of claim 1355, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

1357. The system of claim 1355, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined first or second property using an in situ control technique during use.

1358. The system of claim 1339, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

1359. The system of claim 1358, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during said moving.

1360. The system of claim 1339, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

1361. The system of claim 1339, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

1362. The system of claim 1361, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

1363. The system of claim 1339, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to the determined first or second property of the specimen during use.

1364. The system of claim 1339, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedback control technique during use.

1365. The system of claim 1339, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to the determined first or second property using a feedforward control technique during use.

1366. The system of claim 1339, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen.

1367. The system of claim 1366, wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

1368. The system of claim 1366, wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

1369. The system of claim 1366, wherein the database further comprises first and second properties of a plurality of specimens.

1370. The system of claim 1369, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

1371. The system of claim 1370, wherein the remote controller computer is further coupled to the plurality of measurement devices.

1372. The system of claim 1371, wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

1373. The system of claim 1371, wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

1374. The system of claim 1339, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

1375. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a critical dimension of the specimen, and wherein the second property comprises a thin film characteristic of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1376. The method of claim 1375, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1377. The method of claim 1375, wherein the measurement device comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a photo-acoustic device, and a grazing X-ray reflectometer.

1378. The method of claim 1375, wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1379. The method of claim 1375, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

1380. The method of claim 1375, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1381. The method of claim 1375, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1382. The method of claim 1375, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1383. The method of claim 1382, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1384. The method of claim 1375, wherein the remote controller computer is coupled to a process tool.

1385. The method of claim 1375, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1386. The method of claim 1375, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property of the specimen using a feedback control technique.

1387. The method of claim 1375, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property of the specimen using a feedforward control technique.

1388. The method of claim 1375, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

1389. The method of claim 1388, further comprising determining a relationship between the determined properties and at least one of the monitored parameters using the remote controller computer.

1390. The method of claim 1375, further comprising altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

1391. The method of claim 1375, wherein the illumination system and the detection system are coupled to a process chamber of the process tool, further comprising performing said directing and said detecting during a process step.

1392. The method of claim 1391, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

1393. The method of claim 1391, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to the determined first or second property using an in situ control technique.

1394. The method of claim 1375, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage;

performing said directing and said detecting during said moving the specimen.

1395. The method of claim 1375, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

1396. The method of claim 1375, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

1397. The method of claim 1396, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1398. The method of claim 1375, wherein the remote controller computer is coupled to the measurement device.

1399. The method of claim 1398, further comprising altering a sampling frequency of the measurement device using the remote controller computer in response to the determined first or second property of the specimen.

1400. The method of claim 1398, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to the determined first or second property using a feedback control technique.

1401. The method of claim 1398, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to the determined first or second property using a feedforward control technique.

1402. The method of claim 1375, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen.

1403. The method of claim 1402, further comprising calibrating the measurement device using the database and the remote controller computer.

1404. The method of claim 1402, further comprising monitoring output signals generating by the measurement device using the database and the remote controller computer.

1405. The method of claim 1402, wherein the database further comprises first and second properties of a plurality of specimens.

1406. The method of claim 1405, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

1407. The method of claim 1406, further comprising calibrating the plurality of measurement devices using the database and the remote controller computer.

1408. The method of claim 1406, further comprising monitoring output signals generated by the plurality of measurement devices using the database and the remote controller computer.

1409. The method of claim 1375, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

1410. The method of claim 1409, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices using the remote controller computer in response to the determined first or second property of the specimen.

1411. The method of claim 1410, wherein each of the plurality of measurement devices is coupled to one of a plurality of process tools.

1412. The method of claim 1411, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote controller computer in response to the determined first or second property of the specimen.

1413. A system configured to determine at least three properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property, a second property, and a third property of the specimen from the one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

1414. The system of claim 1413, wherein the stage is further configured to move laterally during use.

1415. The system of claim 1413, wherein the stage is further configured to move rotatably during use.

1416. The system of claim 1413, wherein the stage is further configured to move laterally and rotatably during use.

1417. The system of claim 1413, wherein the illumination system comprises a single energy source.

1418. The system of claim 1413, wherein the illumination system comprises more than one energy source.

1419. The system of claim 1413, wherein the detection system comprises a single energy sensitive device.

1420. The system of claim 1413, wherein the detection system comprises more than one energy sensitive devices.

1421. The system of claim 1413, wherein the measurement device further comprises a non-imaging scatterometer.

1422. The system of claim 1413, wherein the measurement device further comprises a scatterometer.

1423. The system of claim 1413, wherein the measurement device further comprises a spectroscopic scatterometer.

1424. The system of claim 1413, wherein the measurement device further comprises a reflectometer.

1425. The system of claim 1413, wherein the measurement device further comprises a spectroscopic reflectometer.

1426. The system of claim 1413, wherein the measurement device further comprises a coherence probe microscope.

1427. The system of claim 1413, wherein the measurement device further comprises a bright field imaging device.

1428. The system of claim 1413, wherein the measurement device further comprises a dark field imaging device.

1429. The system of claim 1413, wherein the measurement device further comprises a bright field and dark field imaging device.

1430. The system of claim 1413, wherein the measurement device further comprises a non-imaging bright field device.

1431. The system of claim 1413, wherein the measurement device further comprises a non-imaging dark field device.

1432. The system of claim 1413, wherein the measurement device further comprises a non-imaging bright field and dark field device.

1433. The system of claim 1413, wherein the measurement device further comprises an ellipsometer.

1434. The system of claim 1413, wherein the measurement device further comprises a spectroscopic ellipsometer.

1435. The system of claim 1413, wherein the measurement device further comprises a dual beam spectrophotometer.

1436. The system of claim 1413, wherein the measurement device further comprises a beam profile ellipsometer.

1437. The system of claim 1413, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1438. The system of claim 1413, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1439. The system of claim 1413, wherein the defects comprise micro defects and macro defects.

1440. The system of claim 1413, wherein the defects comprises micro defects or macro defects.

1441. The system of claim 1413, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

1442. The system of claim 1413, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

1443. The system of claim 1413, wherein the processor is further configured to determine a fourth property of the specimen from the one or more output signals during use, and wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1444. The system of claim 1443, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1445. The system of claim 1413, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

1446. The system of claim 1445, wherein the defects comprise macro defects.

1447. The system of claim 1413, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

1448. The system of claim 1413, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1449. The system of claim 1413, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the system is coupled to an atomic layer deposition tool.

1450. The system of claim 1413, wherein the system is further configured to determine at least three properties of the specimen substantially simultaneously during use.

1451. The system of claim 1413, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that the first, second, and third properties of the specimen at the multiple locations can be determined substantially simultaneously.

1452. The system of claim 1413, wherein the system is coupled to a process tool.

1453. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

1454. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

1455. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

1456. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

1457. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

1458. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

1459. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1460. The system of claim 1413, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1461. The system of claim 1413, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1462. The system of claim 1413, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1463. The system of claim 1413, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

1464. The system of claim 1413, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

1465. The system of claim 1413, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

1466. The system of claim 1413, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

1467. The system of claim 1466, wherein the processor is further configured to determine at least the three properties of the specimen during the process step.

1468. The system of claim 1467, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

1469. The system of claim 1467, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to the determined properties using an in situ control technique during use.

1470. The system of claim 1413, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

1471. The system of claim 1470, wherein the system is further configured to determine at least the three properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

1472. The system of claim 1413, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

1473. The system of claim 1413, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

1474. The system of claim 1473, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

1475. The system of claim 1413, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

1476. The system of claim 1413, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

1477. The system of claim 1413, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

1478. The system of claim 1413, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first, second, and third properties of the specimen.

1479. The system of claim 1478, wherein the processor is further configured to calibrate the measurement device using the database during use.

1480. The system of claim 1478, wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

1481. The system of claim 1478, wherein the database further comprises first, second, and third properties of a plurality of specimens.

1482. The system of claim 1481, wherein the first, second, and third properties of the plurality of specimens are determined using the measurement device.

1483. The system of claim 1481, wherein the first, second, and third properties of the plurality of specimens are determined using a plurality of measurement devices.

1484. The system of claim 1483, wherein the processor is further coupled to the plurality of measurement devices.

1485. The system of claim 1484, wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

1486. The system of claim 1485, wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

1487. The system of claim 1413, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

1488. The system of claim 1413, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is

further configured to calibrate the system and at least the one additional system during use.

1489. The system of claim 1413, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1490. The system of claim 1413, wherein the processor is further coupled to a process tool.

1491. The system of claim 1490, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

1492. The system of claim 1490, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

1493. The system of claim 1490, wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

1494. The system of claim 1493, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

1495. The system of claim 1494, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

1496. The system of claim 1413, wherein the processor is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

1497. The system of claim 1413, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

1498. The system of claim 1497, wherein the local processor is further configured to determine the first, second, and third properties of the specimen during use.

1499. The system of claim 1497, wherein the remote controller computer is further configured to determine the first, second, and properties of the specimen during use.

1500. A method for determining at least three properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a critical dimension of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

1501. The method of claim 1500, further comprising laterally moving the stage during said directing energy and said detecting energy.

1502. The method of claim 1500, further comprising rotatably moving the stage during said directing energy and said detecting energy.

1503. The method of claim 1500, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

1504. The method of claim 1500, wherein the illumination system comprises a single energy source.

1505. The method of claim 1500, wherein the illumination system comprises more than one energy source.

1506. The method of claim 1500, wherein the detection system comprises a single energy sensitive device.

1507. The method of claim 1500, wherein the detection system comprises more than one energy sensitive devices.

1508. The method of claim 1500, wherein the measurement device further comprises a non-imaging scatterometer.

1509. The method of claim 1500, wherein the measurement device further comprises a scatterometer.

1510. The method of claim 1500, wherein the measurement device further comprises a spectroscopic scatterometer.

1511. The method of claim 1500, wherein the measurement device further comprises a reflectometer.

1512. The method of claim 1500, wherein the measurement device further comprises a spectroscopic reflectometer.

1513. The method of claim 1500, wherein the measurement device further comprises a coherence probe microscope.

1514. The method of claim 1500, wherein the measurement device further comprises a bright field imaging device.

1515. The method of claim 1500, wherein the measurement device further comprises a dark field imaging device.

1516. The method of claim 1500, wherein the measurement device further comprises a bright field and dark field imaging device.

1517. The method of claim 1500, wherein the measurement device further comprises a non-imaging bright field device.

1518. The method of claim 1500, wherein the measurement device further comprises a non-imaging dark field device.

1519. The method of claim 1500, wherein the measurement device further comprises a non-imaging bright field and dark field device.

1520. The method of claim 1500, wherein the measurement device further comprises an ellipsometer.

1521. The method of claim 1500, wherein the measurement device further comprises a spectroscopic ellipsometer.

1522. The method of claim 1500, wherein the measurement device further comprises a dual beam spectrophotometer.

1523. The method of claim 1500, wherein the measurement device further comprises a beam profile ellipsometer.

1524. The method of claim 1500, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a

spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1525. The method of claim 1500, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1526. The method of claim 1500, wherein the defects comprise micro defects and macro defects.

1527. The method of claim 1500, wherein the defects comprises micro defects or macro defects.

1528. The method of claim 1500, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

1529. The method of claim 1500, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

1530. The method of claim 1500, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1531. The method of claim 1530, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1532. The method of claim 1500, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

1533. The method of claim 1532, wherein the defects comprise macro defects.

1534. The method of claim 1500, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

1535. The method of claim 1500, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1536. The method of claim 1500, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1537. The method of claim 1500, wherein processing the detected energy to determine the first, second, and third properties of the specimen comprises substantially simultaneously determining the first, second, and third properties of the specimen.

1538. The method of claim 1500, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that the first, second, and third properties of the specimen at the multiple locations can be determined substantially simultaneously.

1539. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool.

1540. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

1541. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

1542. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1543. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

1544. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

1545. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

1546. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1547. The method of claim 1500, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1548. The method of claim 1500, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1549. The method of claim 1500, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

1550. The method of claim 1500, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

1551. The method of claim 1500, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

1552. The method of claim 1500, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

1553. The method of claim 1552, further comprising performing said directing and said detecting during the process step.

1554. The method of claim 1553, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

1555. The method of claim 1553, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

1556. The method of claim 1500, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

1557. The method of claim 1556, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

1558. The method of claim 1500, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

1559. The method of claim 1500, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

1560. The method of claim 1559, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1561. The method of claim 1500, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

1562. The method of claim 1500, further comprising altering a parameter of an instrument coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

1563. The method of claim 1500, further comprising altering a parameter of an instrument coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

1564. The method of claim 1500, further comprising generating a database, wherein the database comprises the determined first, second, and third properties of the specimen.

1565. The method of claim 1564, further comprising calibrating the measurement device using the database.

1566. The method of claim 1564, further comprising monitoring output signals of the measurement device using the database.

1567. The method of claim 1564, wherein the database further comprises first, second, and third properties of a plurality of specimens.

1568. The method of claim 1567, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices.

1569. The method of claim 1568, further comprising calibrating the plurality of measurement devices using the database.

1570. The method of claim 1568, further comprising monitoring output signals of the plurality of measurement devices using the database.

1571. The method of claim 1500, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

1572. The method of claim 1500, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further

comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

1573. The method of claim 1500, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1574. The method of claim 1500, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

1575. The method of claim 1500, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

1576. The method of claim 1500, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

1577. The method of claim 1576, further comprising determining a relationship between the determined properties and at least one of the monitored parameters.

1578. The method of claim 1577, further comprising altering a parameter of at least one of the instruments in response to the relationship.

1579. The method of claim 1500, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to the at least one of the determined properties of the specimen.

1580. The method of claim 1500, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1581. The method of claim 1580, wherein at least partially processing the one or more output signals comprises determining the first, second, and third properties of the specimen.

1582. The method of claim 1580, wherein further processing the partially processed one or more output signals comprises determining the first, second, and third properties of the specimen.

1583. A computer-implemented method for controlling a system configured to determine at least three properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a critical dimension of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

1584. The method of claim 1583, further comprising controlling the stage, wherein the stage is configured to support the specimen.

1585. The method of claim 1583, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

1586. The method of claim 1583, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

1587. The method of claim 1583, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

1588. The method of claim 1583, wherein the illumination system comprises a single energy source.

1589. The method of claim 1583, wherein the illumination system comprises more than one energy source.

1590. The method of claim 1583, wherein the detection system comprises a single energy sensitive device.

1591. The method of claim 1583, wherein the detection system comprises more than one energy sensitive devices.

1592. The method of claim 1583, wherein the measurement device further comprises a non-imaging scatterometer.

1593. The method of claim 1583, wherein the measurement device further comprises a scatterometer.

1594. The method of claim 1583, wherein the measurement device further comprises a spectroscopic scatterometer.

1595. The method of claim 1583, wherein the measurement device further comprises a reflectometer.

1596. The method of claim 1583, wherein the measurement device further comprises a spectroscopic reflectometer.

1597. The method of claim 1583, wherein the measurement device further comprises a coherence probe microscope.

1598. The method of claim 1583, wherein the measurement device further comprises a bright field imaging device.

1599. The method of claim 1583, wherein the measurement device further comprises a dark field imaging device.

1600. The method of claim 1583, wherein the measurement device further comprises a bright field and dark field imaging device.

1601. The method of claim 1583, wherein the measurement device further comprises a non-imaging bright field device.

1602. The method of claim 1583, wherein the measurement device further comprises a non-imaging dark field device.

1603. The method of claim 1583, wherein the measurement device further comprises a non-imaging bright field and dark field device.

1604. The method of claim 1583, wherein the measurement device further comprises an ellipsometer.

1605. The method of claim 1583, wherein the measurement device further comprises a spectroscopic ellipsometer.

1606. The method of claim 1583, wherein the measurement device further comprises a dual beam spectrophotometer.

1607. The method of claim 1583, wherein the measurement device further comprises a beam profile ellipsometer.

1608. The method of claim 1583, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1609. The method of claim 1583, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1610. The method of claim 1583, wherein the defects comprise micro defects and macro defects.

1611. The method of claim 1583, wherein the defects comprises micro defects or macro defects.

1612. The method of claim 1583, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

1613. The method of claim 1583, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

1614. The method of claim 1583, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1615. The method of claim 1614, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1616. The method of claim 1583, further comprising:

controlling the illumination system to direct energy toward a bottom surface of the specimen; and

controlling the detection system to detect energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

1617. The method of claim 1616, wherein the defects comprise macro defects.

1618. The method of claim 1583, wherein the measurement device further comprises non-optical components, and wherein controlling the detection system comprises controlling the detection system to measure a non-optical characteristic of the surface of the specimen.

1619. The method of claim 1583, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1620. The method of claim 1583, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the system is coupled to an atomic layer deposition tool.

1621. The method of claim 1583, wherein processing the one or more output signals to determine the first, second, and third properties of the specimen comprises substantially simultaneously determining the first, second, and third properties of the specimen.

1622. The method of claim 1583, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that the first, second, and third properties of the specimen at the multiple locations can be determined substantially simultaneously.

1623. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool.

1624. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

1625. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

1626. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1627. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

1628. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

1629. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

1630. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured

to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1631. The method of claim 1583, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1632. The method of claim 1583, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1633. The method of claim 1583, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

1634. The method of claim 1583, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

1635. The method of claim 1583, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

1636. The method of claim 1583, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

1637. The method of claim 1636, further comprising controlling the illumination system and controlling the detection system during the process step.

1638. The method of claim 1637, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

1639. The method of claim 1637, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

1640. The method of claim 1583, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

1641. The method of claim 1640, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

1642. The method of claim 1583, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

1643. The method of claim 1583, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

1644. The method of claim 1643, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1645. The method of claim 1583, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

1646. The method of claim 1583, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

1647. The method of claim 1583, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

1648. The method of claim 1583, further comprising generating a database, wherein the database comprises the determined first, second, and third properties of the specimen.

1649. The method of claim 1648, further comprising calibrating the measurement device using the database.

1650. The method of claim 1648, further comprising monitoring output signals of the measurement device using the database.

1651. The method of claim 1648, wherein the database further comprises first, second, and third properties of a plurality of specimens.

1652. The method of claim 1648, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices.

1653. The method of claim 1652, further comprising calibrating the plurality of measurement devices using the database.

1654. The method of claim 1652, further comprising monitoring output signals of the plurality of measurement devices using the database.

1655. The method of claim 1583, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

1656. The method of claim 1583, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

1657. The method of claim 1583, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1658. The method of claim 1583, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

1659. The method of claim 1583, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

1660. The method of claim 1583, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

1661. The method of claim 1660, further comprising determining a relationship between the determined properties and at least one of the monitored parameters.

1662. The method of claim 1661, further comprising altering a parameter of at least one of the instruments in response to the relationship.

1663. The method of claim 1583, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

1664. The method of claim 1583, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1665. The method of claim 1664, wherein at least partially processing the one or more output signals comprises determining the first, second, and third properties of the specimen.

1666. The method of claim 1664, wherein further processing the partially processed one or more output signals comprises determining the first, second, and third properties of the specimen.

1667. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a critical dimension of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

1668. The device of claim 1667, wherein the illumination system comprises a single energy source.

1669. The device of claim 1667, wherein the illumination system comprises more than one energy source.

1670. The device of claim 1667, wherein the detection system comprises a single energy sensitive device.

1671. The device of claim 1667, wherein the detection system comprises more than one energy sensitive devices.

1672. The device of claim 1667, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1673. The device of claim 1667, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1674. The device of claim 1667, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1675. The device of claim 1667, wherein the defects comprise micro defects and macro defects.

1676. The device of claim 1667, wherein the defects comprises micro defects or macro defects.

1677. The device of claim 1667, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

1678. The device of claim 1667, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

1679. The device of claim 1667, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1680. The device of claim 1679, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1681. The device of claim 1667, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

1682. The device of claim 1681, wherein the defects comprise macro defects.

1683. The device of claim 1667, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

1684. The device of claim 1667, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1685. The device of claim 1667, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1686. The device of claim 1667, wherein the stage and the measurement device are coupled to a process tool.

1687. The device of claim 1667, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1688. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property

comprises a critical dimension of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the portion of the specimen.

1689. The method of claim 1688, wherein the illumination system comprises a single energy source.

1690. The method of claim 1688, wherein the illumination system comprises more than one energy source.

1691. The method of claim 1688, wherein the detection system comprises a single energy sensitive device.

1692. The method of claim 1688, wherein the detection system comprises more than one energy sensitive devices.

1693. The method of claim 1688, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1694. The method of claim 1688, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a

spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1695. The method of claim 1688, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1696. The method of claim 1688, wherein the defects comprise micro defects and macro defects.

1697. The method of claim 1688, wherein the defects comprises micro defects or macro defects.

1698. The method of claim 1688, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

1699. The method of claim 1688, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

1700. The method of claim 1688, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1701. The method of claim 1700, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1702. The method of claim 1688, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

1703. The method of claim 1702, wherein the defects comprise macro defects.

1704. The method of claim 1688, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

1705. The method of claim 1688, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1706. The method of claim 1688, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1707. The method of claim 1688, wherein the stage and the measurement device are coupled to a process tool.

1708. The method of claim 1688, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1709. A system configured to determine at least three properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property, a second property, and a third property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a critical dimension of the specimen, wherein the second property comprises a presence of

defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

1710. The system of claim 1709, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1711. The system of claim 1709, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1712. The system of claim 1709, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1713. The system of claim 1709, wherein the defects comprise micro defects and macro defects.

1714. The system of claim 1709, wherein the defects comprises micro defects or macro defects.

1715. The system of claim 1709, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

1716. The system of claim 1709, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

1717. The system of claim 1709, wherein the remote controller computer is further configured to determine a fourth property of the specimen from the at least partially processed one or more output signals during use, and wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1718. The system of claim 1717, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1719. The system of claim 1709, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

1720. The system of claim 1719, wherein the defects comprise macro defects.

1721. The system of claim 1709, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

1722. The system of claim 1709, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1723. The system of claim 1709, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the system is coupled to an atomic layer deposition tool.

1724. The system of claim 1709, wherein the remote controller computer is coupled to a process tool.

1725. The system of claim 1709, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from a group consisting of a lithography tool, an etch tool, and a deposition tool.

1726. The system of claim 1709, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

1727. The system of claim 1709, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

1728. The system of claim 1709, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

1729. The system of claim 1728, wherein the remote controller computer is further configured to determine a relationship between the determined properties and at least one of the monitored parameters during use.

1730. The system of claim 1729, wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

1731. The system of claim 1709, wherein the remote controller computer is coupled to a process tool, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first, second, and third properties of the specimen during the process step.

1732. The system of claim 1731, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

1733. The system of claim 1731, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

1734. The system of claim 1709, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

1735. The system of claim 1734, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first, second, and third properties of the specimen during said moving.

1736. The system of claim 1709, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

1737. The system of claim 1709, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

1738. The system of claim 1737, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

1739. The system of claim 1709, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

1740. The system of claim 1709, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

1741. The system of claim 1709, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

1742. The system of claim 1709, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first, second, and third properties of the specimen.

1743. The system of claim 1742, wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

1744. The system of claim 1742, wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

1745. The system of claim 1742, wherein the database further comprises first, second, and third properties of a plurality of specimens.

1746. The system of claim 1745, wherein the first, second, and third properties of the plurality of specimens are determined using a plurality of measurement devices.

1747. The system of claim 1746, wherein the remote controller computer is further coupled to the plurality of measurement devices.

1748. The system of claim 1747, wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

1749. The system of claim 1747, wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

1750. The system of claim 1709, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to one of a plurality of process tools.

1751. A method for determining at least three properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a critical dimension of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1752. The method of claim 1751, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1753. The method of claim 1751, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a

spectroscopic reflectometer, a coherence probe microscope, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, an ellipsometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer.

1754. The method of claim 1751, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1755. The method of claim 1751, wherein the defects comprise micro defects and macro defects.

1756. The method of claim 1751, wherein the defects comprises micro defects or macro defects.

1757. The method of claim 1751, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

1758. The method of claim 1751, wherein the defects comprise macro defects on a back side of the specimen, and wherein the macro defects comprise copper contamination.

1759. The method of claim 1751, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1760. The method of claim 1759, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1761. The method of claim 1751, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

1762. The method of claim 1761, wherein the defects comprise macro defects.

1763. The method of claim 1751, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprising measuring a non-optical characteristic of the specimen.

1764. The method of claim 1751, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer.

1765. The method of claim 1751, wherein the measurement device further comprises at least an eddy current device and a spectroscopic ellipsometer, and wherein the measurement device is further coupled to an atomic layer deposition tool.

1766. The method of claim 1751, wherein the remote controller computer is coupled to a process tool.

1767. The method of claim 1751, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, and a deposition tool.

1768. The method of claim 1751, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedback control technique.

1769. The method of claim 1751, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedforward control technique.

1770. The method of claim 1751, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

1771. The method of claim 1770, further comprising determining a relationship between the determined properties and at least one of the monitored parameters using the remote controller computer.

1772. The method of claim 1771, further comprising altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

1773. The method of claim 1751, wherein the illumination system and the detection system are coupled to a process chamber of the process tool, the method further comprising performing said directing and said detecting during a process step.

1774. The method of claim 1773, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

1775. The method of claim 1773, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using an in situ control technique.

1776. The method of claim 1751, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage; and

performing said directing and said detecting during said moving the specimen.

1777. The method of claim 1751, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

1778. The method of claim 1751, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

1779. The method of claim 1778, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1780. The method of claim 1751, wherein the remote controller computer is coupled to the measurement device.

1781. The method of claim 1780, further comprising altering a sampling frequency of the measurement device using the remote controller computer in response to at least one of the determined properties of the specimen.

1782. The method of claim 1780, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

1783. The method of claim 1780, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedforward control technique.

1784. The method of claim 1751, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first, second, and third properties of the specimen.

1785. The method of claim 1784, further comprising calibrating the measurement device using the database and the remote controller computer.

1786. The method of claim 1784, further comprising monitoring output signals of the measurement device using the database and the remote controller computer.

1787. The method of claim 1784, wherein the database further comprises first, second, and third properties of a plurality of specimens.

1788. The method of claim 1787, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices.

1789. The method of claim 1788, further comprising calibrating the plurality of measurement devices using the database and the remote controller computer.

1790. The method of claim 1788, further comprising monitoring output signals of the plurality of measurement devices using the database and the remote controller computer.

1791. The method of claim 1751, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

1792. The method of claim 1751, further comprising altering a parameter of one or more instruments coupled to at least one of a plurality of process tools using the remote controller computer in response to at least one of the determined properties of the specimen.

1793. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises a presence of micro defects on the specimen.

1794. The system of claim 1793, wherein the stage is further configured to move laterally during use.

1795. The system of claim 1793, wherein the stage is further configured to move rotatably during use.

1796. The system of claim 1793, wherein the stage is further configured to move laterally and rotatably during use.

1797. The system of claim 1793, wherein the illumination system comprises a single energy source.

1798. The system of claim 1793, wherein the illumination system comprises more than one energy source.

1799. The system of claim 1793, wherein the detection system comprises a single energy sensitive device.

1800. The system of claim 1793, wherein the detection system comprises more than one energy sensitive devices.

1801 The system of claim 1793, wherein the measurement device further comprises a non-imaging scatterometer.

1802. The system of claim 1793, wherein the measurement device further comprises a scatterometer.

1803. The system of claim 1793, wherein the measurement device further comprises a spectroscopic scatterometer.

1804. The system of claim 1793, wherein the measurement device further comprises a reflectometer.

1805. The system of claim 1793, wherein the measurement device further comprises a spectroscopic reflectometer.

1806. The system of claim 1793, wherein the measurement device further comprises an ellipsometer.

1807. The system of claim 1793, wherein the measurement device further comprises a spectroscopic ellipsometer.

1808. The system of claim 1793, wherein the measurement device further comprises a bright field imaging device.

1809. The system of claim 1793, wherein the measurement device further comprises a dark field imaging device.

1810. The system of claim 1793, wherein the measurement device further comprises a bright field and dark field imaging device.

1811. The system of claim 1793, wherein the measurement device further comprises a non-imaging bright field device.

1812. The system of claim 1793, wherein the measurement device further comprises a non-imaging dark field device.

1813. The system of claim 1793, wherein the measurement device further comprises a non-imaging bright field and dark field device.

1814. The system of claim 1793, wherein the measurement device further comprises a double dark field device.

1815. The system of claim 1793, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

1816. The system of claim 1793, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1817. The system of claim 1793, wherein the processor is further configured to determine a third property from the one or more output signals during use, wherein the third property comprises a thickness of a copper film, and wherein the macro defects or the micro defects comprise voids in the copper film.

1818. The system of claim 1793, wherein the macro defects comprise copper contamination on a back side of the specimen.

1819. The system of claim 1793, wherein the processor is further configured to determine a third property of the specimen from the one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of

the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1820. The system of claim 1819, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1821. The system of claim 1793, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

1822. The system of claim 1793, wherein the system is further configured to determine at least two properties of the specimen substantially simultaneously during use.

1823. The system of claim 1793, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1824. The system of claim 1793, wherein the system is coupled to a process tool.

1825. The system of claim 1793, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

1826. The system of claim 1793, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

1827. The system of claim 1793, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

1828. The system of claim 1793, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

1829. The system of claim 1793, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

1830. The system of claim 1793, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

1831. The system of claim 1793, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1832. The system of claim 1793, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1833. The system of claim 1793, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

1834. The system of claim 1793, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1835. The system of claim 1793, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

1836. The system of claim 1793, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

1837. The system of claim 1793, wherein the system comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

1838. The system of claim 1793, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

1839. The system of claim 1838, wherein the processor is further configured to determine at least the first and second properties of the specimen during the process step.

1840. The system of claim 1839, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

1841. The system of claim 1839, wherein the processor is coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

1842. The system of claim 1793, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

1843. The system of claim 1842, wherein the system is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

1844. The system of claim 1793, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

1845. The system of claim 1793, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

1846. The system of claim 1845, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

1847. The system of claim 1793, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

1848. The system of claim 1793, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

1849. The system of claim 1793, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

1850. The system of claim 1793, wherein the processor is further configured to generate a database during use, and wherein the database comprises the determined first and second properties of the specimen.

1851. The system of claim 1850, wherein the processor is further configured to calibrate the measurement device using the database during use.

1852. The system of claim 1850, wherein the processor is further configured to monitor the determined properties generated by measurement device using the database during use.

1853. The system of claim 1850, wherein the database further comprises first and second properties of a plurality of specimens.

1854. The system of claim 1853, wherein the first and second properties of the plurality of specimens are determined using the measurement device.

1855. The system of claim 1853, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices.

1856. The system of claim 1855, wherein the processor is further coupled to the plurality of measurement devices.

1857. The system of claim 1856, wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

1858. The system of claim 1856, wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

1859. The system of claim 1793, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

1860. The system of claim 1793, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

1861. The system of claim 1793, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1862. The system of claim 1793, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

1863. The system of claim 1793, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

1864. The system of claim 1793, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

1865. The system of claim 1864, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

1866. The system of claim 1864, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

1867. The system of claim 1793, wherein the processor is further coupled to a plurality of measurement devices, and wherein at least one of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

1868. The system of claim 1793, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

1869. The system of claim 1793, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

1870. The system of claim 1869, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

1871. The system of claim 1869, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

1872. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises a presence of micro defects on the specimen.

1873. The method of claim 1872, further comprising laterally moving the stage during said directing energy and said detecting energy.

1874. The method of claim 1872, further comprising rotatably moving the stage during said directing energy and said detecting energy.

1875. The method of claim 1872, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

1876. The method of claim 1872, wherein the illumination system comprises a single energy source.

1877. The method of claim 1872, wherein the illumination system comprises more than one energy source.

1878. The method of claim 1872, wherein the detection system comprises a single energy sensitive device.

1879. The method of claim 1872, wherein the detection system comprises more than one energy sensitive devices.

1880. The method of claim 1872, wherein detecting light comprises detecting dark field light propagating along a dark field path from the surface of the specimen.

1881. The method of claim 1872, wherein the measurement device further comprises a non-imaging scatterometer.

1882. The method of claim 1872, wherein the measurement device further comprises a scatterometer.

1883. The method of claim 1872, wherein the measurement device further comprises a spectroscopic scatterometer.

1884. The method of claim 1872, wherein the measurement device further comprises a reflectometer.

1885. The method of claim 1872, wherein the measurement device further comprises a spectroscopic reflectometer.

1886. The method of claim 1872, wherein the measurement device further comprises an ellipsometer.

1887. The method of claim 1872, wherein the measurement device further comprises a spectroscopic ellipsometer.

1888. The method of claim 1872, wherein the measurement device further comprises a bright field imaging device.

1889. The method of claim 1872, wherein the measurement device further comprises a dark field imaging device.

1890. The method of claim 1872, wherein the measurement device further comprises a bright field and dark field imaging device.

1891. The method of claim 1872, wherein the measurement device further comprises a non-imaging bright field device.

1892. The method of claim 1872, wherein the measurement device further comprises a non-imaging dark field device.

1893. The method of claim 1872, wherein the measurement device further comprises a non-imaging bright field and dark field device.

1894. The method of claim 1872, wherein the measurement device further comprises a double dark field device.

1895. The method of claim 1872, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

1896. The method of claim 1872, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1897. The method of claim 1872, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

1898. The method of claim 1872, further comprising processing the one or more output signals to determine a thickness of a copper film, and wherein the macro defects or the micro defects comprise voids in the copper film.

1899. The method of claim 1872, wherein the macro defects comprise copper contamination on a back side of the specimen.

1900. The method of claim 1872, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1901. The method of claim 1900, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1902. The method of claim 1872, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

1903. The method of claim 1872, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1904. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool.

1905. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

1906. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

1907. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

1908. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

1909. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

1910. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

1911. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1912. The method of claim 1872, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1913. The method of claim 1872, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1914. The method of claim 1872, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

1915. The method of claim 1872, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

1916. The method of claim 1872, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

1917. The method of claim 1872, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process

chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

1918. The method of claim 1917, further comprising performing said directing and said detecting during the process step.

1919. The method of claim 1917, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

1920. The method of claim 1917, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

1921. The method of claim 1872, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

1922. The method of claim 1921, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

1923. The method of claim 1872, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

1924. The method of claim 1872, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

1925. The method of claim 1924, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

1926. The method of claim 1872, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

1927. The method of claim 1872, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

1928. The method of claim 1872, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

1929. The method of claim 1872, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

1930. The method of claim 1929, further comprising calibrating the measurement device using the database.

1931. The method of claim 1929, further comprising monitoring output signals generated by the measurement device using the database.

1932. The method of claim 1929, wherein the database further comprises first and second properties of a plurality of specimens.

1933. The method of claim 1932, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

1934. The method of claim 1933, further comprising calibrating the plurality of measurement devices using the database.

1935. The method of claim 1933, further comprising monitoring output signals generated by the plurality of measurement devices using the database.

1936. The method of claim 1872, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

1937. The method of claim 1872, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

1938. The method of claim 1872, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

1939. The method of claim 1872, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

1940. The method of claim 1872, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

1941. The method of claim 1872, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

1942. The method of claim 1941, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

1943. The method of claim 1942, further comprising altering a parameter of at least one of the instruments in response to the relationship.

1944. The method of claim 1872, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

1945. The method of claim 1872, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

1946. The method of claim 1872, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

1947. The method of claim 1946, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

1948. The method of claim 1946, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

1949. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises a presence of micro defects on the specimen.

1950. The method of claim 1949, further comprising controlling the stage, wherein the stage is configured to support the specimen.

1951. The method of claim 1949, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

1952. The method of claim 1949, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

1953. The method of claim 1949, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

1954. The method of claim 1949, wherein the illumination system comprises a single energy source.

1955. The method of claim 1949, wherein the illumination system comprises more than one energy source.

1956. The method of claim 1949, wherein the detection system comprises a single energy sensitive device.

1957. The method of claim 1949, wherein the detection system comprises more than one energy sensitive devices.

1958. The method of claim 1949, wherein the measurement device further comprises a non-imaging scatterometer.

1959. The method of claim 1949, wherein the measurement device further comprises a scatterometer.

1960. The method of claim 1949, wherein the measurement device further comprises a spectroscopic scatterometer.

1961. The method of claim 1949, wherein the measurement device further comprises a reflectometer.

1962. The method of claim 1949, wherein the measurement device further comprises a spectroscopic reflectometer

1963. The method of claim 1949, wherein the measurement device further comprises an ellipsometer.

1964. The method of claim 1949, wherein the measurement device further comprises a spectroscopic ellipsometer.

1965. The method of claim 1949, wherein the measurement device further comprises a bright field imaging device.

1966. The method of claim 1949, wherein the measurement device further comprises a dark field imaging device.

1967. The method of claim 1949, wherein the measurement device further comprises a bright field and dark field imaging device.

1968. The method of claim 1949, wherein the measurement device further comprises a non-imaging bright field device.

1969. The method of claim 1949, wherein the measurement device further comprises a non-imaging dark field device.

1970. The method of claim 1949, wherein the measurement device further comprises a non-imaging bright field and dark field device.

1971. The method of claim 1949, wherein the measurement device further comprises a double dark field device.

1972. The method of claim 1949, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright

field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

1973. The method of claim 1949, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

1974. The method of claim 1949, further comprising:

controlling the illumination system to direct energy toward a bottom surface of the specimen; and

controlling the detection system to detect energy propagating from the bottom surface of the specimen, wherein the first property comprises a presence of defects on the bottom surface of the specimen.

1975. The method of claim 1949, further comprising processing the one or more output signals to determine a thickness of a copper film, and wherein the macro defects or the micro defects comprise voids in the copper film.

1976. The method of claim 1949, wherein the macro defects comprise copper contamination on a back side of the specimen.

1977. The method of claim 1949, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is

selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

1978. The method of claim 1977, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

1979. The method of claim 1949, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

1980. The method of claim 1949, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

1981. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool.

1982. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

1983. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

1984. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

1985. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

1986. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

1987. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

1988. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

1989. The method of claim 1949, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured

to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

1990. The method of claim 1949, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

1991. The method of claim 1949, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

1992. The method of claim 1949, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

1993. The method of claim 1949, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of s process tool.

1994. The method of claim 1949, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

1995. The method of claim 1994, further comprising controlling the illumination system and controlling the detection system during the process step.

1996. The method of claim 1995, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

1997. The method of claim 1995, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

1998. The method of claim 1949, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

1999. The method of claim 1998, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

2000. The method of claim 1949, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

2001. The method of claim 1949, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

2002. The method of claim 2001, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2003. The method of claim 1949, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties.

2004. The method of claim 1949, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

2005. The method of claim 1949, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

2006. The method of claim 1949, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

2007. The method of claim 1949, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals generated by the measurement device using the database.

2008. The method of claim 1949, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2009. The method of claim 1949, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and

wherein the database further comprises first and second properties of a plurality of specimens generated using a plurality of measurement devices.

2010. The method of claim 2009, further comprising calibrating the plurality of measurement devices using the database.

2011. The method of claim 2009, further comprising monitoring output signals generated by the plurality of measurement devices using the database.

2012. The method of claim 1949, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

2013. The method of claim 1949, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

2014. The method of claim 1949, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2015. The method of claim 1949, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

2016. The method of claim 1949, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

2017. The method of claim 1949, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

2018. The method of claim 1949, further comprising monitoring a parameter of one or more instruments coupled to a process tool and determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

2019. The method of claim 1949, further comprising monitoring a parameter of one or more instruments coupled to a process tool, determining a relationship between at least one of the determined properties and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

2020. The method of claim 1949, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

2021. The method of claim 1949, wherein the measurement device comprises non-optical components, and wherein controlling the detection system to detect energy comprises controlling the non-optical components to measure a non-optical characteristic of the surface of the specimen.

2022. The method of claim 1949, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2023. The method of claim 2022, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

2024. The method of claim 2022, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

2025. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises a presence of micro defects on the specimen.

2026. The device of claim 2025, wherein the illumination system comprises a single energy source.

2027. The device of claim 2025, wherein the illumination system comprises more than one energy source.

2028. The device of claim 2025, wherein the detection system comprises a single energy sensitive device.

2029. The device of claim 2025, wherein the detection system comprises more than one energy sensitive devices.

2030. The device of claim 2025, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a

bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2031. The device of claim 2025, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2032. The device of claim 2025, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2033. The device of claim 2025, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

2034. The device of claim 2025, further comprising processing the one or more output signals to determine a thickness of a copper film, and wherein the macro defects or the micro defects comprise voids in the copper film.

2035. The device of claim 2025, wherein the macro defects comprise copper contamination on a back side of the specimen.

2036. The device of claim 2025, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2037. The device of claim 2036, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2038. The device of claim 2025, wherein the stage and the measurement device are coupled to a process tool.

2039. The device of claim 2025, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

2040. The device of claim 2025, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

2041. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises a presence of micro defects on the specimen.

2042. The method of claim 2041, wherein the illumination system comprises a single energy source.

2043. The method of claim 2041, wherein the illumination system comprises more than one energy source.

2044. The method of claim 2041, wherein the detection system comprises a single energy sensitive device.

2045. The method of claim 2041, wherein the detection system comprises more than one energy sensitive devices.

2046. The method of claim 2041, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2047. The method of claim 2041, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray

fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2048. The method of claim 2041, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2049. The method of claim 2041, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

2050. The method of claim 2041, further comprising processing the one or more output signals to determine a thickness of a copper film, and wherein the macro defects or the micro defects comprise voids in the copper film.

2051. The method of claim 2041, wherein the macro defects comprise copper contamination on a back side of the specimen.

2052. The method of claim 2041, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2053. The method of claim 2052, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2054. The method of claim 2041, wherein the stage and the measurement device are coupled to a process tool.

2055. The method of claim 2041, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

2056. The method of claim 2041, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

2057. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use,

wherein the measurement device is configured to generate one or more output signals responsive to the detected energy;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises a presence of micro defects on the specimen.

2058. The system of claim 2057, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2059. The system of claim 2057, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a

spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2060. The system of claim 2057, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2061. The system of claim 2057, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

2062. The system of claim 2057, wherein the remote controller computer is configured to determine a third property from the at least partially processed one or more output signals during use, wherein the third property comprises a thickness of a copper film, and wherein the macro defects or the micro defects comprise voids in the copper film.

2063. The system of claim 2057, wherein the macro defects comprise copper contamination on a back side of the specimen.

2064. The system of claim 2057, wherein the remote controller computer is further configured to determine a third property of the specimen from the at least partially

processed one or more output signals during use, and wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2065. The system of claim 2064, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2066. The system of claim 2057, wherein the remote controller computer is coupled to a process tool.

2067. The system of claim 2057, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

2068. The system of claim 2057, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

2069. The system of claim 2057, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

2070. The system of claim 2057, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

2071. The system of claim 2070, wherein the remote controller computer is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

2072. The system of claim 2071, wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

2073. The system of claim 2057, wherein the remote controller computer is coupled to a process tool, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

2074. The system of claim 2073, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

2075. The system of claim 2073, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

2076. The system of claim 2057, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

2077. The system of claim 2076, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during said moving.

2078. The system of claim 2057, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

2079. The system of claim 2057, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

2080. The system of claim 2079, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

2081. The system of claim 2057, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

2082. The system of claim 2057, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

2083. The system of claim 2057, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

2084. The system of claim 2057, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

2085. The system of claim 2057, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

2086. The system of claim 2057, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2087. The system of claim 2057, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens determined using a plurality of measurement devices.

2088. The system of claim 2087, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

2089. The system of claim 2087, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

2090. The system of claim 2057, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein each of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

2091. The system of claim 2057, wherein the remote controller computer is further coupled to a plurality of process tools, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

2092. The system of claim 2057, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the surface of the specimen.

2093. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a presence of macro defects on the specimen, and wherein the second property comprises a presence of micro defects on the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2094. The method of claim 2093, wherein the measurement device is selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2095. The method of claim 2093, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a spectroscopic reflectometer, an ellipsometer, a spectroscopic ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a double dark field device, an X-ray reflectometer, an X-ray fluorescence device, an optical fluorescence device, an eddy current imaging device, and a relatively large spot e-beam device.

2096. The method of claim 2093, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2097. The method of claim 2093, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the first property further comprises a presence of macro defects on the bottom surface of the specimen.

2098. The method of claim 2093, further comprising processing the one or more output signals to determine a thickness of a copper film, and wherein the macro defects or the micro defects comprise voids in the copper film.

2099. The method of claim 2093, wherein the macro defects comprise copper contamination on a back side of the specimen.

2100. The method of claim 2093, further comprising processing the one or more output signals to determine a third property of the specimen, wherein the third property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2101. The method of claim 2100, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2102. The method of claim 2093, wherein the remote controller computer is coupled to a process tool.

2103. The method of claim 2093, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from the group consisting of a

lithography tool, an etch tool, an ion implanter, a chemical-mechanical polishing tool, a deposition tool, a thermal tool, a cleaning tool, and a plating tool.

2104. The method of claim 2093, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedback control technique.

2105. The method of claim 2093, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedforward control technique.

2106. The method of claim 2093, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

2107. The method of claim 2093, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer and determining a relationship between at least one of the determined properties and at least one of the monitored parameters using the remote controller computer.

2108. The method of claim 2093, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer, determining

a relationship between at least one of the determined properties and at least one of the monitored parameters using the remote controller computer, and altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

2109. The method of claim 2093, wherein the illumination system and the detection system are coupled to a process chamber of a process tool, the method further comprising performing said directing and said detecting during a process step.

2110. The method of claim 2109, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

2111. The method of claim 2109, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using an in situ control technique.

2112. The method of claim 2093, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage; and

performing said directing and said detecting during said moving the specimen.

2113. The method of claim 2093, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

2114. The method of claim 2093, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

2115. The method of claim 2114, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2116. The method of claim 2093, wherein the remote controller computer is coupled to the measurement device.

2117. The method of claim 2116, further comprising altering a sampling frequency of the measurement device using the remote controller computer in response to at least one of the determined properties of the specimen.

2118. The method of claim 2116, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

2119. The method of claim 2116, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedforward control technique.

2120. The method of claim 2093, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen.

2121. The method of claim 2093, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the remote controller computer and the database.

2122. The method of claim 2093, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals generated by the measurement device using the remote controller computer and the database.

2123. The method of claim 2093, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2124. The method of claim 2123, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices.

2125. The method of claim 2124, further comprising calibrating the plurality of measurement devices using the remote controller computer and the database.

2126. The method of claim 2124, further comprising monitoring output signals generated by the plurality of measurement devices using the remote controller computer and the database.

2127. The method of claim 2093, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote

controller computer, wherein each of the plurality of local processors is coupled to a measurement device.

2128. The method of claim 2127, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices using the remote controller computer in response to at least one of the determined properties of the specimen.

2129. The method of claim 2127, wherein at least one of the plurality of measurement devices is coupled to one of a plurality of process tools.

2130. The method of claim 2129, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote controller computer in response to at least one of the determined properties of the specimen.

2131. The method of claim 2093, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the surface of the specimen.

2132. A system configured to determine at least three properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property, a second property, and a third property of the specimen from the one or more output signals during use, wherein the first property comprises a flatness measurement of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

2133. The system of claim 2132, wherein the stage is further configured to move laterally during use.

2134. The system of claim 2132, wherein the stage is further configured to move rotatably during use.

2135. The system of claim 2132, wherein the stage is further configured to move laterally and rotatably during use.

2136. The system of claim 2132, wherein the illumination system comprises a single energy source.

2137. The system of claim 2132, wherein the illumination system comprises more than one energy source.

2138. The system of claim 2132, wherein the detection system comprises a single energy sensitive device.

2139. The system of claim 2132, wherein the detection system comprises more than one energy sensitive devices.

2140. The system of claim 2132, wherein the measurement device further comprises an optical profilometer.

2141. The system of claim 2132, wherein the measurement device further comprises an interferometer.

2142. The system of claim 2132, wherein the measurement device further comprises a spectroscopic reflectometer.

2143. The system of claim 2132, wherein the measurement device further comprises a spectroscopic ellipsometer.

2144. The system of claim 2132, wherein the measurement device further comprises a dual beam spectrophotometer.

2145. The system of claim 2132, wherein the measurement device further comprises a beam profile ellipsometer.

2146. The system of claim 2132, wherein the measurement device further comprises a non-imaging scatterometer.

2147. The system of claim 2132, wherein the measurement device further comprises a scatterometer.

2148. The system of claim 2132, wherein the measurement device further comprises a spectroscopic scatterometer.

2149. The system of claim 2132, wherein the measurement device further comprises a reflectometer.

2150. The system of claim 2132, wherein the measurement device further comprises an ellipsometer.

2151. The system of claim 2132, wherein the measurement device further comprises a bright field imaging device.

2152. The system of claim 2132, wherein the measurement device further comprises a dark field imaging device.

2153. The system of claim 2132, wherein the measurement device further comprises a bright field and dark field imaging device.

2154. The system of claim 2132, wherein the measurement device further comprises a non-imaging bright field device.

2155. The system of claim 2132, wherein the measurement device further comprises a non-imaging dark field device.

2156. The system of claim 2132, wherein the measurement device further comprises a non-imaging bright field and dark field device.

2157. The system of claim 2132, wherein the measurement device further comprises a double dark field device.

2158. The system of claim 2132, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2159. The system of claim 2132, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2160. The system of claim 2132, wherein the defects comprise micro defects and macro defects.

2161. The system of claim 2132, wherein the defects comprises micro defects or macro defects.

2162. The system of claim 2132, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

2163. The system of claim 2132, wherein the defects comprise copper contamination on a back side of the specimen.

2164. The system of claim 2132, wherein the processor is further configured to determine a fourth property of the specimen from the one or more output signals during use, and wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2165. The system of claim 2164, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2166. The system of claim 2132, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2167. The system of claim 2166, wherein the defects comprise macro defects.

2168. The system of claim 2132, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the specimen.

2169. The system of claim 2132, wherein the system is further configured to determine at least the three properties of the specimen substantially simultaneously during use.

2170. The system of claim 2132, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that the first, second, and third properties of the specimen at the multiple locations can be determined substantially simultaneously.

2171. The system of claim 2132, wherein the system is coupled to a semiconductor fabrication process tool.

2172. The system of claim 2132, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

2173. The system of claim 2132, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

2174. The system of claim 2132, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

2175. The system of claim 2132, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

2176. The system of claim 2132, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

2177. The system of claim 2132, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

2178. The system of claim 2132, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2179. The system of claim 2132, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2180. The system of claim 2132, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a chemical-mechanical polishing tool, and a thermal tool.

2181. The system of claim 2132, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the

measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2182. The system of claim 2132, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2183. The system of claim 2132, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2184. The system of claim 2132, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2185. The system of claim 2132, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

2186. The system of claim 2185, wherein the processor is further configured to determine at least the three properties of the specimen during the process step.

2187. The system of claim 2186, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

2188. The system of claim 2186, wherein the processor is further coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

2189. The system of claim 2132, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

2190. The system of claim 2189, wherein the system is further configured to determine at least the three properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

2191. The system of claim 2132, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

2192. The system of claim 2132, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

2193. The system of claim 2192, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

2194. The system of claim 2132, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

2195. The system of claim 2132, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

2196. The system of claim 2132, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

2197. The system of claim 2132, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined properties of the specimen, and wherein the processor is further configured to calibrate the measurement device using the database during use.

2198. The system of claim 2132, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined properties of the specimen, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

2199. The system of claim 2132, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined properties of the specimen, and wherein the database further comprises first, second, and third properties of a plurality of specimens.

2200. The system of claim 2199, wherein the first, second, and third properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

2201. The system of claim 2199, wherein the first, second, and third properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

2202. The system of claim 2132, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

2203. The system of claim 2132, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

2204. The system of claim 2132, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to

at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2205. The system of claim 2132, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

2206. The system of claim 2132, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

2207. The system of claim 2132, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

2208. The system of claim 2207, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

2209. The system of claim 2208, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

2210. The system of claim 2132, wherein the processor is further coupled to a plurality of measurement devices, and wherein at least one of the plurality of measurement devices is coupled to one of a plurality of process tools.

2211. The system of claim 2132, wherein the processor is further coupled to a plurality of process tools, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

2212. The system of claim 2132, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

2213. The system of claim 2212, wherein the local processor is further configured to determine the first, second, and third properties of the specimen during use.

2214. The system of claim 2212, wherein the remote controller computer is further configured to determine the first, second, and third properties of the specimen during use.

2215. A method for determining at least three properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a flatness measurement of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

2216. The method of claim 2215, further comprising laterally moving the stage during said directing energy and said detecting energy.

2217. The method of claim 2215, further comprising rotatably moving the stage during said directing energy and said detecting energy.

2218. The method of claim 2215, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

2219. The method of claim 2215, wherein the illumination system comprises a single energy source.

2220. The method of claim 2215, wherein the illumination system comprises more than one energy source.

2221. The method of claim 2215, wherein the detection system comprises a single energy sensitive device.

2222. The method of claim 2215, wherein the detection system comprises more than one energy sensitive devices.

2223. The method of claim 2215, wherein the measurement device further comprises an optical profilometer.

2224. The method of claim 2215, wherein the measurement device further comprises an interferometer.

2225. The method of claim 2215, wherein the measurement device further comprises a spectroscopic reflectometer.

2226. The method of claim 2215, wherein the measurement device further comprises a spectroscopic ellipsometer.

2227. The method of claim 2215, wherein the measurement device further comprises a dual beam spectrophotometer.

2228. The method of claim 2215, wherein the measurement device further comprises a beam profile ellipsometer.

2229. The method of claim 2215, wherein the measurement device further comprises a non-imaging scatterometer.

2230. The method of claim 2215, wherein the measurement device further comprises a scatterometer.

2231. The method of claim 2215, wherein the measurement device further comprises a spectroscopic scatterometer.

2232. The method of claim 2215, wherein the measurement device further comprises a reflectometer.

2233. The method of claim 2215, wherein the measurement device further comprises an ellipsometer.

2234. The method of claim 2215, wherein the measurement device further comprises a bright field imaging device.

2235. The method of claim 2215, wherein the measurement device further comprises a dark field imaging device.

2236. The method of claim 2215, wherein the measurement device further comprises a bright field and dark field imaging device.

2237. The method of claim 2215, wherein the measurement device further comprises a non-imaging bright field device.

2238. The method of claim 2215, wherein the measurement device further comprises a non-imaging dark field device.

2239. The method of claim 2215, wherein the measurement device further comprises a non-imaging bright field and dark field device.

2240. The method of claim 2215, wherein the measurement device further comprises a double dark field device.

2241. The method of claim 2215, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2242. The method of claim 2215, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2243. The method of claim 2215, wherein the defects comprise micro defects and macro defects.

2244. The method of claim 2215, wherein the defects comprises micro defects or macro defects.

2245. The method of claim 2215, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

2246. The method of claim 2215, wherein the defects comprise copper contamination on a back side of the specimen.

2247. The method of claim 2215, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2248. The method of claim 2247, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2249. The method of claim 2215, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property comprises a presence of defects on the bottom surface of the specimen.

2250. The method of claim 2249, wherein the defects comprise macro defects.

2251. The method of claim 2215, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the specimen.

2252. The method of claim 2215, wherein processing the one or more output signals to determine the first, second, and properties of the specimen comprises substantially simultaneously determining the first, second, and third properties of the specimen.

2253. The method of claim 2215, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that the first, second, and third properties of the specimen at the multiple locations can be determined substantially simultaneously.

2254. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool.

2255. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

2256. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

2257. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, and wherein the semiconductor fabrication process tool is selected from the group consisting of a lithography tool, an etch tool, a chemical-mechanical polishing tool, and a thermal tool.

2258. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

2259. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

2260. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

2261. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2262. The method of claim 2215, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2263. The method of claim 2215, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2264. The method of claim 2215, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2265. The method of claim 2215, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2266. The method of claim 2215, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2267. The method of claim 2215, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

2268. The method of claim 2267, further comprising performing said directing and said detecting during the process step.

2269. The method of claim 2268, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

2270. The method of claim 2268, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

2271. The method of claim 2215, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

2272. The method of claim 2271, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

2273. The method of claim 2215, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

2274. The method of claim 2215, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

2275. The method of claim 2274, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2276. The method of claim 2215, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

2277. The method of claim 2215, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

2278. The method of claim 2215, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

2279. The method of claim 2215, further comprising generating a database, wherein the database comprises the determined properties of the specimen, the method further comprising calibrating the measurement device using the database.

2280. The method of claim 2215, further comprising generating a database, wherein the database comprises the determined properties of the specimen, the method further comprising monitoring output signals generated by the measurement device using the database.

2281. The method of claim 2215, further comprising generating a database, wherein the database comprises the determined properties of the specimen, and wherein the database further comprises first, second, and third properties of a plurality of specimens.

2282. The method of claim 2281, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

2283. The method of claim 2281, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals generated by the plurality of measurement devices using the database.

2284. The method of claim 2215, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

2285. The method of claim 2215, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

2286. The method of claim 2215, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2287. The method of claim 2215, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

2288. The method of claim 2215, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

2289. The method of claim 2215, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

2290. The method of claim 2215, further comprising monitoring a parameter of an instrument coupled to a process tool and determining a relationship between the at least one of the determined properties and at least one of the monitored parameters.

2291. The method of claim 2215, further comprising monitoring a parameter of an instrument coupled to a process tool, determining a relationship between the at least one of the determined properties and at least one of the monitored parameters, and altering a parameter of at least one of the instruments in response to the relationship.

2292. The method of claim 2215, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

2293. The method of claim 2215, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2294. The method of claim 2293, wherein at least partially processing the one or more output signals comprises determining the first, second, and third properties of the specimen.

2295. The method of claim 2293, wherein further processing the partially processed one or more output signals comprises determining the first, second, and third properties of the specimen.

2296. A computer-implemented method for controlling a system configured to determine at least three properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a flatness measurement of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

2297. The method of claim 2296, further comprising controlling the stage, wherein the stage is configured to support the specimen.

2298. The method of claim 2296, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

2299. The method of claim 2296, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

2300. The method of claim 2296, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

2301. The method of claim 2296, wherein the illumination system comprises a single energy source.

2302. The method of claim 2296, wherein the illumination system comprises more than one energy source.

2303. The method of claim 2296, wherein the detection system comprises a single energy sensitive device.

2304. The method of claim 2296, wherein the detection system comprises more than one energy sensitive devices.

2305. The method of claim 2296, wherein the measurement device comprises an optical profilometer.

2306. The method of claim 2296, wherein the measurement device further comprises an interferometer.

2307. The method of claim 2296, wherein the measurement device further comprises a spectroscopic reflectometer.

2308. The method of claim 2296, wherein the measurement device further comprises a spectroscopic ellipsometer.

2309. The method of claim 2296, wherein the measurement device further comprises a dual beam spectrophotometer.

2310. The method of claim 2296, wherein the measurement device further comprises a beam profile ellipsometer.

2311. The method of claim 2296, wherein the measurement device further comprises a non-imaging scatterometer.

2312. The method of claim 2296, wherein the measurement device further comprises a scatterometer.

2313. The method of claim 2296, wherein the measurement device further comprises a spectroscopic scatterometer.

2314. The method of claim 2296, wherein the measurement device further comprises a reflectometer.

2315. The method of claim 2296, wherein the measurement device further comprises an ellipsometer.

2316. The method of claim 2296, wherein the measurement device further comprises a bright field imaging device.

2317. The method of claim 2296, wherein the measurement device further comprises a dark field imaging device.

2318. The method of claim 2296, wherein the measurement device further comprises a bright field and dark field imaging device.

2319. The method of claim 2296, wherein the measurement device further comprises a non-imaging bright field device.

2320. The method of claim 2296, wherein the measurement device further comprises a non-imaging dark field device.

2321. The method of claim 2296, wherein the measurement device further comprises a non-imaging bright field and dark field device.

2322. The method of claim 2296, wherein the measurement device further comprises a double dark field device.

2323. The method of claim 2296, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging

device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2324. The method of claim 2296, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2325. The method of claim 2296, wherein the defects comprise micro defects and macro defects.

2326. The method of claim 2296, wherein the defects comprises micro defects or macro defects.

2327. The method of claim 2296, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

2328. The method of claim 2296, wherein the defects comprise copper contamination on a back side of the specimen.

2329. The method of claim 2296, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2330. The method of claim 2329, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2331. The method of claim 2296, further comprising:

controlling the illumination system to direct energy toward a bottom surface of the specimen; and

controlling the detection system to detect energy propagating from the bottom surface of the specimen, wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2332. The method of claim 2331, wherein the defects comprise macro defects.

2333. The method of claim 2296, wherein the measurement device further comprises non-optical components, and wherein controlling the detection system to detect energy comprises controlling the non-optical components to measure a non-optical characteristic of the specimen.

2334. The method of claim 2296, wherein processing the one or more output signals to determine the first, second, and third properties of the specimen comprises substantially simultaneously determining the first, second, and third properties of the specimen.

2335. The method of claim 2296, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that the first, second, and third properties of the specimen at the multiple locations can be determined substantially simultaneously.

2336. The method of claim 2296, wherein the stage and the measurement device are coupled to a process tool.

2337. The method of claim 2296, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

2338. The method of claim 2296, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

2339. The method of claim 2296, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, and etch tool, a chemical-mechanical polishing tool, and a thermal tool.

2340. The method of claim 2296, further comprising controlling a wafer handler to move the specimen from a process tool to the stage, wherein the wafer handler is coupled to the process tool.

2341. The method of claim 2296, further comprising controlling the stage to move the specimen from the system to a process tool.

2342. The method of claim 2296, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

2343. The method of claim 2296, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2344. The method of claim 2296, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2345. The method of claim 2296, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2346. The method of claim 2296, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2347. The method of claim 2296, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2348. The method of claim 2296, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2349. The method of claim 2296, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

2350. The method of claim 2349, further comprising controlling the illumination system and controlling the detection system during the process step.

2351. The method of claim 2350, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

2352. The method of claim 2350, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

2353. The method of claim 2296, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

2354. The method of claim 2353, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

2355. The method of claim 2296, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

2356. The method of claim 2296, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

2357. The method of claim 2356, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2358. The method of claim 2296, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

2359. The method of claim 2296, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

2360. The method of claim 2296, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

2361. The method of claim 2296, further comprising generating a database, wherein the database comprises the determined first, second, and third properties of the specimen, the method further comprising calibrating the measurement device using the database.

2362. The method of claim 2296, further comprising generating a database, wherein the database comprises the determined first, second, and third properties of the specimen, the method further comprising monitoring output signals generated by the measurement device using the database.

2363. The method of claim 2296, further comprising generating a database, wherein the database comprises the determined first, second, and third properties of the specimen, and wherein the database further comprises first, second, and third properties of a plurality of specimens.

2364. The method of claim 2363, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

2365. The method of claim 2363, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals generated by the plurality of measurement devices using the database.

2366. The method of claim 2296, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

2367. The method of claim 2296, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

2368. The method of claim 2296, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least

one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2369. The method of claim 2296, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedback control technique.

2370. The method of claim 2296, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen using a feedforward control technique.

2371. The method of claim 2296, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

2372. The method of claim 2371, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

2373. The method of claim 2372, further comprising altering a parameter of at least one of the instruments in response to the relationship.

2374. The method of claim 2296, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

2375. The method of claim 2296, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2376. The method of claim 2375, wherein at least partially processing the one or more output signals comprises determining the first, second, and third properties of the specimen.

2377. The method of claim 2375, wherein further processing the partially processed one or more output signals comprises determining the first, second, and third properties of the specimen.

2378. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a flatness measurement of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

2379. The device of claim 2378, wherein the illumination system comprises a single energy source.

2380. The device of claim 2378, wherein the illumination system comprises more than one energy source.

2381. The device of claim 2378, wherein the detection system comprises a single energy sensitive device.

2382. The device of claim 2378, wherein the detection system comprises more than one energy sensitive devices.

2383. The device of claim 2378, wherein the measurement device is selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field

imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2384. The device of claim 2378, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2385. The device of claim 2378, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2386. The device of claim 2378, wherein the defects comprise micro defects and macro defects.

2387. The device of claim 2378, wherein the defects comprises micro defects or macro defects.

2388. The device of claim 2378, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

2389. The device of claim 2378, wherein the defects comprise copper contamination on a back side of the specimen.

2390. The device of claim 2378, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2391. The device of claim 2390, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2392. The device of claim 2378, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2393. The device of claim 2392, wherein the defects comprise macro defects.

2394. The device of claim 2378, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the specimen.

2395. The device of claim 2378, wherein the stage and the measurement device are coupled to a process tool.

2396. The device of claim 2378, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a chemical-mechanical polishing tool, and a thermal tool.

2397. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals in response to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a flatness measurement of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

2398. The method of claim 2397, wherein the illumination system comprises a single energy source.

2399. The method of claim 2397, wherein the illumination system comprises more than one energy source.

2400. The method of claim 2397, wherein the detection system comprises a single energy sensitive device.

2401. The method of claim 2397, wherein the detection system comprises more than one energy sensitive devices.

2402. The method of claim 2397, wherein the measurement device is selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2403. The method of claim 2397, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and

dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2404. The method of claim 2397, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2405. The method of claim 2397, wherein the defects comprise micro defects and macro defects.

2406. The method of claim 2397, wherein the defects comprises micro defects or macro defects.

2407. The method of claim 2397, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

2408. The method of claim 2397, wherein the defects comprise copper contamination on a back side of the specimen.

2409. The method of claim 2397, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2410. The method of claim 2409, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2411. The method of claim 2397, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2412. The method of claim 2411, wherein the defects comprise macro defects.

2413. The method of claim 2397, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the specimen.

2414. The method of claim 2397, wherein the stage and the measurement device are coupled to a process tool.

2415. The method of claim 2397, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a chemical-mechanical polishing tool, and a thermal tool.

2416. A system configured to determine at least three properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals in response to the detected energy;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property, a second property, and a third property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises a flatness measurement of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen.

2417. The system of claim 2416, wherein the measurement device is selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field

device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2418. The system of claim 2416, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2419. The system of claim 2416, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2420. The system of claim 2416, wherein the defects comprise micro defects and macro defects.

2421. The system of claim 2416, wherein the defects comprises micro defects or macro defects.

2422. The system of claim 2416, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

2423. The system of claim 2416, wherein the defects comprise copper contamination on a back side of the specimen.

2424. The system of claim 2416, wherein the remote controller computer is further configured to determine a fourth property of the specimen from the at least partially processed one or more output signals during use, and wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2425. The system of claim 2424, wherein the system is coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2426. The system of claim 2416, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2427. The system of claim 2426, wherein the defects comprise macro defects.

2428. The system of claim 2416, wherein the illumination system and the detection system comprise non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the specimen.

2429. The system of claim 2416, wherein the remote controller computer is coupled to a process tool.

2430. The system of claim 2416, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from a group consisting of a lithography tool, an etch tool, a chemical-mechanical polishing tool, and a thermal tool.

2431. The system of claim 2416, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

2432. The system of claim 2416, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

2433. The system of claim 2416, wherein the remote controller computer is coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

2434. The system of claim 2433, wherein the remote controller computer is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

2435. The system of claim 2434, wherein the remote controller computer is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

2436. The system of claim 2416, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the

detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first, second, and third properties of the specimen during the process step.

2437. The system of claim 2436, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

2438. The system of claim 2436, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

2439. The system of claim 2416, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

2440. The system of claim 2439, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first, second, and third properties of the specimen during said moving.

2441. The system of claim 2416, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

2442. The system of claim 2416, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

2443. The system of claim 2442, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

2444. The system of claim 2416, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

2445. The system of claim 2416, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

2446. The system of claim 2416, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

2447. The system of claim 2416, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the

determined first, second, and third properties of the specimen, and wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

2448. The system of claim 2416, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first, second, and third properties of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

2449. The system of claim 2416, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first, second, and third properties of the specimen, and wherein the database further comprises first, second, and third properties of a plurality of specimens.

2450. The system of claim 2449, wherein the first, second, and third properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

2451. The system of claim 2449, wherein the first, second, and third properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

2452. The system of claim 2416, wherein the remote controller computer is further coupled to a plurality of measurement devices, wherein each of the plurality of measurement devices is coupled to one of a plurality of process tools.

2453. The system of claim 2416, wherein the remote controller computer is coupled to at least one of a plurality of process tools, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

2454. A method for determining at least three properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property, a second property, and a third property of the specimen, wherein the first property comprises a flatness measurement of the specimen, wherein the second property comprises a presence of defects on the specimen, and wherein the third property comprises a thin film characteristic of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2455. The method of claim 2454, wherein the measurement device is selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2456. The method of claim 2454, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of an optical profilometer, an interferometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, and a beam profile ellipsometer a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a bright field imaging device, a dark field imaging device, a bright field and dark field imaging device, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, and a double dark field device.

2457. The method of claim 2454, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2458. The method of claim 2454, wherein the defects comprise micro defects and macro defects.

2459. The method of claim 2454, wherein the defects comprises micro defects or macro defects.

2460. The method of claim 2454, wherein the thin film characteristic comprises a thickness of a copper film, and wherein the defects comprise voids in the copper film.

2461. The method of claim 2454, wherein the defects comprise copper contamination on a back side of the specimen.

2462. The method of claim 2454, further comprising processing the one or more output signals to determine a fourth property of the specimen, wherein the fourth property is selected from the group consisting of a roughness of the specimen, a roughness of a layer on the specimen, and a roughness of a feature of the specimen.

2463. The method of claim 2462, wherein the stage and the measurement device are coupled to a process tool selected from the group consisting of a lithography tool, an atomic layer deposition tool, a cleaning tool, and an etch tool.

2464. The method of claim 2454, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2465. The method of claim 2464, wherein the defects comprise macro defects.

2466. The method of claim 2454, wherein the measurement device comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the specimen.

2467. The method of claim 2454, wherein the remote controller computer is coupled to a process tool.

2468. The method of claim 2454, wherein the remote controller computer is coupled to a process tool, and wherein the process tool is selected from the group consisting of a lithography tool, an etch tool, a chemical-mechanical polishing tool, and a thermal tool.

2469. The method of claim 2454, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen comprises using a feedback control technique.

2470. The method of claim 2454, wherein the remote controller computer is coupled to a process tool, the method further comprising altering a parameter of one or more

instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen comprises using a feedforward control technique.

2471. The method of claim 2454, wherein the remote controller computer is coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

2472. The method of claim 2471, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters using the remote controller computer.

2473. The method of claim 2472, further comprising altering a parameter of at least one of the instruments in response to the relationship using the remote controller computer.

2474. The method of claim 2454, wherein the illumination system and the detection system are coupled to a process chamber of a process tool, the method further comprising performing said directing and said detecting during a process step.

2475. The method of claim 2474, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

2476. The method of claim 2474, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using an in situ control technique.

2477. The method of claim 2454, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage; and

performing said directing and said detecting during said moving the specimen.

2478. The method of claim 2454, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

2479. The method of claim 2454, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

2480. The method of claim 2479, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2481. The method of claim 2454, wherein the remote controller computer is coupled to the measurement device, the method further comprising altering a sampling frequency of the measurement device using the remote controller computer in response to at least one of the determined properties of the specimen.

2482. The method of claim 2454, wherein the remote controller computer is coupled to the measurement device, the method further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

2483. The method of claim 2454, wherein the remote controller computer is coupled to the measurement device, the method further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedforward control technique.

2484. The method of claim 2454, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first, second and third properties of the specimen.

2485. The method of claim 2454, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first, second and third properties of the specimen, the method further comprising calibrating the measurement device using the remote controller computer.

2486. The method of claim 2454, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first, second and third properties of the specimen, the method further comprising monitoring output signals generated by the measurement device using the remote controller computer.

2487. The method of claim 2454, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first, second and third properties of the specimen, and wherein the database further comprises first, second, and third properties of a plurality of specimens.

2488. The method of claim 2487, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices, the method

further comprising calibrating the plurality of measurement devices using the remote controller computer.

2489. The method of claim 2487, wherein the first, second, and third properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals generated by the plurality of measurement devices using the remote controller computer.

2490. The method of claim 2454, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

2491. The method of claim 2490, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of measurement devices using the remote controller computer in response to at least one of the determined properties of the specimen.

2492. The method of claim 2490, wherein at least one of the plurality of measurement devices is coupled to one of a plurality of process tools.

2493. The method of claim 2492, further comprising altering a parameter of one or more instruments coupled to at least one of the plurality of process tools using the remote controller computer in response to at least one of the determined properties of the specimen.

2494. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises overlay misregistration of the specimen, and wherein the second property comprises a flatness measurement of the specimen.

2495. The system of claim 2494, wherein the stage is further configured to move laterally during use.

2496. The system of claim 2494, wherein the stage is further configured to move rotatably during use.

2497. The system of claim 2494, wherein the stage is further configured to move laterally and rotatably during use.

2498. The system of claim 2494, wherein the illumination system comprises a single energy source.

2499. The system of claim 2494, wherein the illumination system comprises more than one energy source.

2500. The system of claim 2494, wherein the detection system comprises a single energy sensitive device.

2501. The system of claim 2494, wherein the detection system comprises more than one energy sensitive devices.

2502. The system of claim 2494, wherein the measurement device further comprises a coherence probe microscope.

2503. The system of claim 2494, wherein the measurement device further comprises an interferometer.

2504. The system of claim 2494, wherein the measurement device further comprises an optical profilometer.

2505. The system of claim 2494, wherein the measurement device further comprises a spectroscopic reflectometer.

2506. The system of claim 2494, wherein the measurement device further comprises a spectroscopic ellipsometer.

2507. The system of claim 2494, wherein the measurement device further comprises a dual beam spectrophotometer.

2508. The system of claim 2494, wherein the measurement device further comprises a beam profile ellipsometer.

2509. The system of claim 2494, wherein the measurement device further comprises a non-imaging scatterometer.

2510. The system of claim 2494, wherein the measurement device further comprises a scatterometer.

2511. The system of claim 2494, wherein the measurement device further comprises a spectroscopic scatterometer.

2512. The system of claim 2494, wherein the measurement device further comprises a reflectometer.

2513. The system of claim 2494, wherein the measurement device further comprises a bright field imaging device.

2514. The system of claim 2494, wherein the measurement device further comprises a dark field imaging device.

2515. The system of claim 2494, wherein the measurement device further comprises a bright field and dark field imaging device.

2516. The system of claim 2494, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2517. The system of claim 2494, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2518. The system of claim 2494, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

2519. The system of claim 2494, wherein the system is coupled to a process tool.

2520. The system of claim 2494, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

2521. The system of claim 2494, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

2522. The system of claim 2494, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

2523. The system of claim 2494, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

2524. The system of claim 2494, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

2525. The system of claim 2494, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

2526. The system of claim 2494, wherein the system is coupled to a lithography tool, wherein the system is configured to determine the flatness measurement of the specimen prior to an exposure step of the lithography process, and wherein the system is configured to determine the overlay misregistration subsequent to the exposure step of the lithography process.

2527. The system of claim 2494, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2528. The system of claim 2494, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2529. The system of claim 2494, wherein the system is coupled to a process tool, and wherein the process tool comprises a lithography tool.

2530. The system of claim 2494, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2531. The system of claim 2494, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2532. The system of claim 2494, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2533. The system of claim 2494, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2534. The system of claim 2494, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

2535. The system of claim 2534, wherein the processor is further configured to determine at least the two properties of the specimen during the process step.

2536. The system of claim 2535, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

2537. The system of claim 2535, wherein the processor is further coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

2538. The system of claim 2494, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

2539. The system of claim 2538, wherein the system is further configured to determine at least one of the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

2540. The system of claim 2494, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

2541. The system of claim 2494, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

2542. The system of claim 2541, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

2543. The system of claim 2494, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

2544. The system of claim 2494, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

2545. The system of claim 2494, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

2546. The system of claim 2494, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to calibrate the measurement device using the database during use.

2547. The system of claim 2494, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

2548. The system of claim 2494, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens determined using a plurality of measurement devices.

2549. The system of claim 2548, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

2550. The system of claim 2548, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

2551. The system of claim 2494, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

2552. The system of claim 2494, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is

further configured to calibrate the system and at least the one additional system during use.

2553. The system of claim 2494, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2554. The system of claim 2494, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

2555. The system of claim 2494, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

2556. The system of claim 2494, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

2557. The system of claim 2556, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

2558. The system of claim 2557, wherein the processor is further configured to alter a parameter of at least one of the instruments in response to the relationship during use.

2559. The system of claim 2494, wherein the processor is further coupled to a plurality of measurement devices, and wherein the plurality of measurement devices is coupled to a plurality of process tools.

2560. The system of claim 2494, wherein the processor is further coupled to a plurality of process tools, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

2561. The system of claim 2494, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

2562. The system of claim 2561, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

2563. The system of claim 2561, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

2564. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises overlay misregistration of the specimen, and wherein the second property comprises a flatness measurement of the specimen.

2565. The method of claim 2564, further comprising laterally moving the stage during said directing energy and said detecting energy.

2566. The method of claim 2564, further comprising rotatably moving the stage during said directing energy and said detecting energy.

2567. The method of claim 2564, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

2568. The method of claim 2564, wherein the illumination system comprises a single energy source.

2569. The method of claim 2564, wherein the illumination system comprises more than one energy source.

2570. The method of claim 2564, wherein the detection system comprises a single energy sensitive device.

2571. The method of claim 2564, wherein the detection system comprises more than one energy sensitive devices.

2572. The method of claim 2564, wherein the measurement device further comprises a coherence probe microscope.

2573. The method of claim 2564, wherein the measurement device further comprises an interferometer.

2574. The method of claim 2564, wherein the measurement device further comprises an optical profilometer.

2575. The method of claim 2564, wherein the measurement device further comprises a spectroscopic reflectometer.

2576. The method of claim 2564, wherein the measurement device further comprises a spectroscopic ellipsometer.

2577. The method of claim 2564, wherein the measurement device further comprises a dual beam spectrophotometer.

2578. The method of claim 2564, wherein the measurement device further comprises a beam profile ellipsometer.

2579. The method of claim 2564, wherein the measurement device further comprises a non-imaging scatterometer.

2580. The method of claim 2564, wherein the measurement device further comprises a scatterometer.

2581. The method of claim 2564, wherein the measurement device further comprises a spectroscopic scatterometer.

2582. The method of claim 2564, wherein the measurement device further comprises a reflectometer.

2583. The method of claim 2564, wherein the measurement device further comprises a bright field imaging device.

2584. The method of claim 2564, wherein the measurement device further comprises a dark field imaging device.

2585. The method of claim 2564, wherein the measurement device further comprises a bright field and dark field imaging device.

2586. The method of claim 2564, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic

reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2587. The method of claim 2564, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2588. The method of claim 2564, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

2589. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool.

2590. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

2591. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

2592. The method of claim 2564, wherein the stage and the measurement device are coupled to a lithography tool.

2593. The method of claim 2564, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the flatness measurement of the specimen prior to an exposure step of the lithography process and determining the overlay misregistration subsequent to the exposure step of the lithography process.

2594. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

2595. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

2596. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

2597. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2598. The method of claim 2564, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2599. The method of claim 2564, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2600. The method of claim 2564, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2601. The method of claim 2564, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2602. The method of claim 2564, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2603. The method of claim 2564, wherein the stage and the measurement device are disposed within a measurement chamber, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

2604. The method of claim 2603, further comprising performing said directing and said detecting during the process step.

2605. The method of claim 2604, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

2606. The method of claim 2604, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

2607. The method of claim 2564, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

2608. The method of claim 2607, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

2609. The method of claim 2564, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

2610. The method of claim 2564, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

2611. The method of claim 2610, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2612. The method of claim 2564, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

2613. The method of claim 2564, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

2614. The method of claim 2564, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

2615. The method of claim 2564, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen.

2616. The method of claim 2564, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

2617. The method of claim 2564, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

2618. The method of claim 2564, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2619. The method of claim 2618, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

2620. The method of claim 2618, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

2621. The method of claim 2564, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

2622. The method of claim 2564, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

2623. The method of claim 2564, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one

parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2624. The method of claim 2564, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedback control technique.

2625. The method of claim 2564, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedforward control technique.

2626. The method of claim 2564, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

2627. The method of claim 2626, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

2628. The method of claim 2627, further comprising altering a parameter of at least one of the instruments in response to the relationship.

2629. The method of claim 2564, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

2630. The method of claim 2564, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2631. The method of claim 2630, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

2632. The method of claim 2630, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

2633. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, the method comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises overlay misregistration of the specimen, and wherein the second property comprises a flatness measurement of the specimen.

2634. The method of claim 2633, further comprising controlling the stage, wherein the stage is configured to support the specimen.

2635. The method of claim 2633, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

2636. The method of claim 2633, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

2637. The method of claim 2633, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

2638. The method of claim 2633, wherein the illumination system comprises a single energy source.

2639. The method of claim 2633, wherein the illumination system comprises more than one energy source.

2640. The method of claim 2633, wherein the detection system comprises a single energy sensitive device.

2641. The method of claim 2633, wherein the detection system comprises more than one energy sensitive devices.

2642. The method of claim 2633, wherein the measurement device further comprises a coherence probe microscope.

2643. The method of claim 2633, wherein the measurement device further comprises an interferometer.

2644. The method of claim 2633, wherein the measurement device further comprises an optical profilometer.

2645. The method of claim 2633, wherein the measurement device further comprises a spectroscopic reflectometer.

2646. The method of claim 2633, wherein the measurement device further comprises a spectroscopic ellipsometer.

2647. The method of claim 2633, wherein the measurement device further comprises a dual beam spectrophotometer.

2648. The method of claim 2633, wherein the measurement device further comprises a beam profile ellipsometer.

2649. The method of claim 2633, wherein the measurement device further comprises a non-imaging scatterometer.

2650. The method of claim 2633, wherein the measurement device further comprises a scatterometer.

2651. The method of claim 2633, wherein the measurement device further comprises a spectroscopic scatterometer.

2652. The method of claim 2633, wherein the measurement device further comprises a reflectometer.

2653. The method of claim 2633, wherein the measurement device further comprises a bright field imaging device.

2654. The method of claim 2633, wherein the measurement device further comprises a dark field imaging device.

2655. The method of claim 2633, wherein the measurement device further comprises a bright field and dark field imaging device.

2656. The method of claim 2633, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic

scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2657. The method of claim 2633, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2658. The method of claim 2633, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

2659. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool.

2660. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

2661. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

2662. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

2663. The method of claim 2633, wherein the system is coupled to a lithography tool, the method further comprising controlling the system to determine the flatness measurement of the specimen prior to an exposure step of the lithography process and controlling the system to determine the overlay misregistration subsequent to the exposure step of the lithography process.

2664. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

2665. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

2666. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

2667. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2668. The method of claim 2633, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured

to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2669. The method of claim 2633, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2670. The method of claim 2633, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2671. The method of claim 2633, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2672. The method of claim 2633, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2673. The method of claim 2633, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

2674. The method of claim 2673, further comprising controlling the illumination system and controlling the detection system during the process step to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

2675. The method of claim 2673, further comprising controlling the illumination system and controlling the detection system during the process step to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

2676. The method of claim 2633, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

2677. The method of claim 2676, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

2678. The method of claim 2633, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

2679. The method of claim 2633, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

2680. The method of claim 2679, further comprising generating an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2681. The method of claim 2633, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

2682. The method of claim 2633, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

2683. The method of claim 2633, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

2684. The method of claim 2633, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

2685. The method of claim 2633, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

2686. The method of claim 2633, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises determined first and second properties of a plurality of specimens.

2687. The method of claim 2686, wherein the determined first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

2688. The method of claim 2686, wherein the determined first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

2689. The method of claim 2633, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

2690. The method of claim 2633, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

2691. The method of claim 2633, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2692. The method of claim 2633, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedback control technique.

2693. The method of claim 2633, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedforward control technique.

2694. The method of claim 2633, further comprising monitoring a parameter of one or more instruments coupled to a process tool.

2695. The method of claim 2694, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

2696. The method of claim 2695, further comprising altering a parameter of at least one of the instruments in response to the relationship.

2697. The method of claim 2633, further comprising altering a parameter of one or more instruments coupled to a plurality of process tools in response to at least one of the determined properties of the specimen.

2698. The method of claim 2633, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2699. The method of claim 2698, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

2700. The method of claim 2698, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

2701. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises overlay misregistration of the specimen, and wherein the second property comprises a flatness measurement of the specimen.

2702. The device of claim 2701, wherein the illumination system comprises a single energy source.

2703. The device of claim 2701, wherein the illumination system comprises more than one energy source.

2704. The device of claim 2701, wherein the detection system comprises a single energy sensitive device.

2705. The device of claim 2701, wherein the detection system comprises more than one energy sensitive devices.

2706. The device of claim 2701, wherein the measurement device is selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2707. The device of claim 2701, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2708. The device of claim 2701, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2709. The device of claim 2701, wherein the stage and the measurement device are coupled to a process tool.

2710. The device of claim 2701, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

2711. The device of claim 2701, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the flatness measurement of the specimen prior to an exposure step of the lithography process and determining the overlay misregistration subsequent to the exposure step of the lithography process.

2712. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises overlay misregistration of the specimen, and wherein the second property comprises a flatness measurement of the specimen.

2713. The method of claim 2712, wherein the illumination system comprises a single energy source.

2714. The method of claim 2712, wherein the illumination system comprises more than one energy source.

2715. The method of claim 2712, wherein the detection system comprises a single energy sensitive device.

2716. The method of claim 2712, wherein the detection system comprises more than one energy sensitive devices.

2717. The method of claim 2712, wherein the measurement device is selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2718. The method of claim 2712, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2719. The method of claim 2712, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2720. The method of claim 2712, wherein the stage and the measurement device are coupled to a process tool.

2721. The method of claim 2712, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool comprises a lithography tool.

2722. The method of claim 2712, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the flatness measurement of the specimen prior to an exposure step of the lithography process and determining the overlay misregistration subsequent to the exposure step of the lithography process.

2723. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use, wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use;

a local processor coupled to the measurement device and configured to at least partially process the one or more output signals during use; and

a remote controller computer coupled to the local processor, wherein the remote controller computer is configured to receive the at least partially processed one or more output signals and to determine a first property and a second property of the specimen from the at least partially processed one or more output signals during use, wherein the first property comprises overlay misregistration of the specimen, and wherein the second property comprises a flatness measurement of the specimen.

2724. The system of claim 2723, wherein the measurement device is selected from the group consisting of a coherence probe microscope, an interferometer, an optical

profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2725. The system of claim 2723, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2726. The system of claim 2723, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2727. The system of claim 2723, wherein the remote controller computer is further coupled to a process tool.

2728. The system of claim 2723, wherein the remote controller computer is further coupled to a process tool, and wherein the process tool comprises a lithography tool.

2729. The system of claim 2723, wherein the system is coupled to a lithography tool, wherein the system is configured to determine the flatness measurement of the specimen prior to an exposure step of the lithography process, and wherein the system is configured

to determine the overlay misregistration subsequent to the exposure step of the lithography process.

2730. The system of claim 2723, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

2731. The system of claim 2723, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

2732. The system of claim 2723, wherein the remote controller computer is further coupled to a process tool, and wherein the remote controller computer is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

2733. The system of claim 2732, wherein the remote controller computer is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

2734. The system of claim 2733, wherein the remote controller computer is further configured to alter a parameter of one or more instruments in response to the relationship during use.

2735. The system of claim 2723, wherein the illumination system is further configured to direct energy toward the surface of the specimen during a process step, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during the process step, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during the process step.

2736. The system of claim 2735, wherein the remote controller computer is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

2737. The system of claim 2735, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

2738. The system of claim 2723, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

2739. The system of claim 2723, wherein the illumination system is further configured to direct energy toward the surface of the specimen during said moving, wherein the detection system is further configured to detect energy propagating from the surface of the specimen during said moving, and wherein the remote controller computer is further configured to determine the first and second properties of the specimen during said moving.

2740. The system of claim 2723, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

2741. The system of claim 2723, wherein the remote controller computer is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

2742. The system of claim 2741, wherein the remote controller computer is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

2743. The system of claim 2723, wherein the remote controller computer is further configured to alter a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen during use.

2744. The system of claim 2723, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

2745. The system of claim 2723, wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

2746. The system of claim 2723, wherein the remote controller computer is further configured to generate a database during use, and wherein the database comprises the determined first and second properties of the specimen.

2747. The system of claim 2723, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to calibrate the measurement device using the database during use.

2748. The system of claim 2723, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the remote controller computer is further configured to monitor output signals generated by measurement device using the database during use.

2749. The system of claim 2723, wherein the remote controller computer is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2750. The system of claim 2749, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

2751. The system of claim 2749, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the remote controller computer is further coupled to the plurality of measurement devices, and wherein the remote controller computer is further configured to calibrate the plurality of measurement devices using the database during use.

2752. The system of claim 2723, wherein the remote controller computer is further coupled to a plurality of measurement devices, and wherein the plurality of measurement devices is coupled to at least one of a plurality of process tools.

2753. The system of claim 2723, wherein the remote controller computer is further coupled to a plurality of process tools, and wherein the remote controller computer is further configured to alter a parameter of one or more instruments coupled to the plurality of process tools during use.

2754. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises overlay misregistration of the specimen, and wherein the second property comprises a flatness measurement of the specimen, comprising:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2755. The method of claim 2754, wherein the measurement device is selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2756. The method of claim 2754, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a coherence probe microscope, an interferometer, an optical profilometer, a spectroscopic reflectometer, a spectroscopic ellipsometer, a dual beam spectrophotometer, a beam profile ellipsometer, a non-imaging scatterometer, a scatterometer, a spectroscopic

scatterometer, a reflectometer, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2757. The method of claim 2754, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2758. The method of claim 2754, wherein the remote controller computer is further coupled to a process tool.

2759. The method of claim 2754, wherein the remote controller computer is further coupled to a process tool, and wherein the process tool is comprises a lithography tool.

2760. The method of claim 2754, wherein the stage and the measurement device are coupled to a lithography tool, the method further comprising determining the flatness measurement of the specimen prior to an exposure step of the lithography process and determining the overlay misregistration subsequent to the exposure step of the lithography process.

2761. The method of claim 2754, wherein the remote controller computer is further coupled to a process tool, the method further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedback control technique.

2762. The method of claim 2754, wherein the remote controller computer is further coupled to a process tool, the method further comprising altering a parameter of one or

more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen using a feedforward control technique.

2763. The method of claim 2754, wherein the remote controller computer is further coupled to a process tool, the method further comprising monitoring a parameter of one or more instruments coupled to the process tool using the remote controller computer.

2764. The method of claim 2763, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters using the remote controller computer.

2765. The method of claim 2764, further comprising altering a parameter of one or more instruments coupled to the process tool in response to the relationship using the remote controller computer.

2766. The method of claim 2754, wherein the illumination system and the detection system are coupled to a process chamber of a process tool, the method further comprising performing said directing and said detecting during a process step.

2767. The method of claim 2766, further comprising obtaining a signature characterizing the process step using the remote controller computer, wherein the signature comprises at least one singularity representative of an end of the process step.

2768. The method of claim 2766, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties using an in situ control technique.

2769. The method of claim 2754, further comprising:

moving the specimen from a first process chamber to a second process chamber using the stage; and

performing said directing and said detecting during said moving the specimen.

2770. The method of claim 2754, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens using the remote controller computer.

2771. The method of claim 2754, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property using the remote controller computer.

2772. The method of claim 2771, further comprising generating an output signal using the remote controller computer if at least one of the determined properties of the specimen is outside of the predetermined range for the property.

2773. The method of claim 2754, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

2774. The method of claim 2754, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedback control technique.

2775. The method of claim 2754, further comprising altering a parameter of one or more instruments coupled to the measurement device using the remote controller computer in response to at least one of the determined properties using a feedforward control technique.

2776. The method of claim 2754, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the remote controller computer and the database.

2777. The method of claim 2754, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring the measurement device using the remote controller computer and the database.

2778. The method of claim 2754, further comprising generating a database using the remote controller computer, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2779. The method of claim 2778, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the remote controller computer and the database.

2780. The method of claim 2778, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further

comprising monitoring output signals of the plurality of measurement devices using the remote controller computer and the database.

2781. The method of claim 2754, further comprising sending the at least partially processed one or more output signals from a plurality of local processors to the remote controller computer, wherein each of the plurality of local processors is coupled to one of a plurality of measurement devices.

2782. The method of claim 2781, wherein at least one of the plurality of measurement devices is coupled to a process tool.

2783. The method of claim 2782, further comprising altering a parameter of one or more instruments coupled to the process tool using the remote controller computer in response to at least one of the determined properties of the specimen.

2784. A system configured to determine at least two properties of a specimen during use, comprising:

a stage configured to support the specimen during use;

a measurement device coupled to the stage, comprising:

an illumination system configured to direct energy toward a surface of the specimen during use; and

a detection system coupled to the illumination system and configured to detect energy propagating from the surface of the specimen during use,

wherein the measurement device is configured to generate one or more output signals responsive to the detected energy during use; and

a processor coupled to the measurement device and configured to determine a first property and a second property of the specimen from the one or more output signals during use, wherein the first property comprises a characteristic of an implanted region of the specimen, and wherein the second property comprises a presence of defects on the specimen.

2785. The system of claim 2784, wherein the stage is further configured to move laterally during use.

2786. The system of claim 2784, wherein the stage is further configured to move rotatably during use.

2787. The system of claim 2784, wherein the stage is further configured to move laterally and rotatably during use.

2788. The system of claim 2784, wherein the illumination system comprises a single energy source.

2789. The system of claim 2784, wherein the illumination system comprises more than one energy source.

2790. The system of claim 2784, wherein the detection system comprises a single energy sensitive device.

2791. The system of claim 2784, wherein the detection system comprises more than one energy sensitive devices.

2792. The system of claim 2784, wherein the measurement device further comprises a modulated optical reflectometer.

2793. The system of claim 2784, wherein the measurement device further comprises an X-ray reflectance device.

2794. The system of claim 2784, wherein the measurement device further comprises an eddy current device.

2795. The system of claim 2784, wherein the measurement device further comprises a photo-acoustic device.

2796. The system of claim 2784, wherein the measurement device further comprises a spectroscopic ellipsometer.

2797. The system of claim 2784, wherein the measurement device further comprises a spectroscopic reflectometer.

2798. The system of claim 2784, wherein the measurement device further comprises a dual beam spectrophotometer.

2799. The system of claim 2784, wherein the measurement device further comprises a non-imaging scatterometer.

2800. The system of claim 2784, wherein the measurement device further comprises a scatterometer.

2801. The system of claim 2784, wherein the measurement device further comprises a spectroscopic scatterometer.

2802. The system of claim 2784, wherein the measurement device further comprises a reflectometer.

2803. The system of claim 2784, wherein the measurement device further comprises an ellipsometer.

2804. The system of claim 2784, wherein the measurement device further comprises a non-imaging bright field device.

2805. The system of claim 2784, wherein the measurement device further comprises a non-imaging dark field device.

2806. The system of claim 2784, wherein the measurement device further comprises a non-imaging bright field and dark field device.

2807. The system of claim 2784, wherein the measurement device further comprises a bright field imaging device.

2808. The system of claim 2784, wherein the measurement device further comprises a dark field imaging device.

2809. The system of claim 2784, wherein the measurement device further comprises a bright field and dark field imaging device.

2810. The system of claim 2784, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a modulated optical reflectometer, an X-ray reflectance device, an eddy current device, a photo-acoustic device, a spectroscopic ellipsometer, a spectroscopic reflectometer, dual beam spectrophotometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2811. The system of claim 2784, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2812. The system of claim 2784, wherein the measurement device further comprises non-optical components, and wherein the detected energy is responsive to a non-optical characteristic of the specimen.

2813. The system of claim 2784, wherein the characteristic of the implanted region is selected from the group consisting of a presence of ions in the implanted region, a concentration of ions in the implanted region, a depth of the implanted region, and a distribution profile of the implanted region.

2814. The system of claim 2784, wherein the defects comprise micro defects and macro defects.

2815. The system of claim 2784, wherein the defects comprises micro defects or macro defects.

2816. The system of claim 2784, wherein the illumination system is further configured to direct energy toward a bottom surface of the specimen during use, wherein the detection system is further configured to detect energy propagating from the bottom surface of the specimen during use, and wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2817. The system of claim 2816, wherein the defects comprise macro defects.

2818. The system of claim 2784, wherein the system is further configured to determine at least the two properties of the specimen substantially simultaneously during use.

2819. The system of claim 2784, wherein the illumination system is further configured to direct energy to multiple locations on the surface of the specimen substantially simultaneously, and wherein the detection system is further configured to detect energy propagating from the multiple locations on the surface of the specimen substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

2820. The system of claim 2784, wherein the system is coupled to a process tool.

2821. The system of claim 2784, wherein the system is coupled to a process tool, and wherein the system is disposed within the process tool.

2822. The system of claim 2784, wherein the system is coupled to a process tool, and wherein the system is arranged laterally proximate to the process tool.

2823. The system of claim 2784, wherein the system is coupled to a process tool, and wherein the process tool comprises a wafer handler configured to move the specimen to the stage during use.

2824. The system of claim 2784, wherein the system is coupled to a process tool, and wherein the stage is configured to move the specimen from the system to the process tool during use.

2825. The system of claim 2784, wherein the system is coupled to a process tool, and wherein the stage is further configured to move the specimen to a process chamber of the process tool during use.

2826. The system of claim 2784, wherein the system is coupled to a process tool, and wherein the system is further configured to determine at least the two properties of the specimen while the specimen is waiting between process steps.

2827. The system of claim 2784, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2828. The system of claim 2784, wherein the system is coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen

during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2829. The system of claim 2784, wherein the system is coupled to a process tool, and wherein the process tool is selected from the group consisting of an ion implanter and a thermal tool.

2830. The system of claim 2784, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2831. The system of claim 2784, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2832. The system of claim 2784, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2833. The system of claim 2784, wherein the system further comprises a measurement chamber, wherein the stage and the measurement device are disposed within the measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2834. The system of claim 2784, wherein a process tool comprises a process chamber, wherein the stage is disposed within the process chamber, and wherein the stage is further configured to support the specimen during a process step.

2835. The system of claim 2834, wherein the processor is further configured to determine at least the two properties of the specimen during the process step.

2836. The system of claim 2835, wherein the processor is further configured to obtain a signature characterizing the process step during use, and wherein the signature comprises at least one singularity representative of an end of the process step.

2837. The system of claim 2835, wherein the processor is further coupled to the process tool and is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique during use.

2838. The system of claim 2784, wherein a process tool comprises a first process chamber and a second process chamber, and wherein the stage is further configured to move the specimen from the first process chamber to the second process chamber during use.

2839. The system of claim 2838, wherein the system is further configured to determine at least the two properties of the specimen as the stage is moving the specimen from the first process chamber to the second process chamber.

2840. The system of claim 2784, wherein the processor is further configured to compare at least one of the determined properties of the specimen and properties of a plurality of specimens during use.

2841. The system of claim 2784, wherein the processor is further configured to compare at least one of the determined properties of the specimen to a predetermined range for the property during use.

2842. The system of claim 2841, wherein the processor is further configured to generate an output signal if at least one of the determined properties of the specimen is outside of the predetermined range for the property during use.

2843. The system of claim 2784, wherein the processor is further configured to alter a sampling frequency of the measurement device in response to t at least one of the determined properties of the specimen during use.

2844. The system of claim 2784, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique during use.

2845. The system of claim 2784, wherein the processor is further configured to alter a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique during use.

2846. The system of claim 2784, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen.

2847. The system of claim 2784, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second

properties of the specimen, and wherein the processor is further configured to calibrate the measurement device using the database during use.

2848. The system of claim 2784, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the processor is further configured to monitor output signals generated by measurement device using the database during use.

2849. The system of claim 2784, wherein the processor is further configured to generate a database during use, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2850. The system of claim 2849, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to calibrate the plurality of measurement devices using the database during use.

2851. The system of claim 2849, wherein the first and second properties of the plurality of specimens are determined using a plurality of measurement devices, wherein the processor is further coupled to the plurality of measurement devices, and wherein the processor is further configured to monitor output signals generated by the plurality of measurement devices using the database during use.

2852. The system of claim 2784, further comprising a stand alone system coupled to the system, wherein the stand alone system is configured to be calibrated with a calibration

standard during use, and wherein the stand alone system is further configured to calibrate the system during use.

2853. The system of claim 2784, further comprising a stand alone system coupled the system and at least one additional system, wherein the stand alone system is configured to be calibrated with a calibration standard during use, and wherein the stand alone system is further configured to calibrate the system and at least the one additional system during use.

2854. The system of claim 2784, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, and wherein the processor is configured to alter at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2855. The system of claim 2784, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedback control technique during use.

2856. The system of claim 2784, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using a feedforward control technique during use.

2857. The system of claim 2784, wherein the processor is further coupled to a process tool, and wherein the processor is further configured to monitor a parameter of one or more instruments coupled to the process tool during use.

2858. The system of claim 2857, wherein the processor is further configured to determine a relationship between at least one of the determined properties and at least one of the monitored parameters during use.

2859. The system of claim 2858, wherein the processor is further configured to alter a parameter of one or more instruments in response to the relationship during use.

2860. The system of claim 2784, wherein the processor is further coupled to a plurality of measurement devices, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of measurement devices during use.

2861. The system of claim 2784, wherein the processor is further coupled to a plurality of measurement devices, and wherein at least one of the plurality of measurement devices is coupled to at least one of a plurality of process tools.

2862. The system of claim 2861, wherein the processor is further coupled to at least one of the plurality of process tools, and wherein the processor is further configured to alter a parameter of one or more instruments coupled to at least one of the plurality of process tools during use.

2863. The system of claim 2784, wherein the processor comprises a local processor coupled to the measurement device and a remote controller computer coupled to the local processor, wherein the local processor is configured to at least partially process the one or

more output signals during use, and wherein the remote controller computer is configured to further process the at least partially processed one or more output signals during use.

2864. The system of claim 2863, wherein the local processor is further configured to determine the first property and the second property of the specimen during use.

2865. The system of claim 2863, wherein the remote controller computer is further configured to determine the first property and the second property of the specimen during use.

2866. A method for determining at least two properties of a specimen, comprising:

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a characteristic of an implanted region of the specimen, and wherein the second property comprises a presence of defects on the specimen.

2867. The method of claim 2866, further comprising laterally moving the stage during said directing energy and said detecting energy.

2868. The method of claim 2866, further comprising rotatably moving the stage during said directing energy and said detecting energy.

2869. The method of claim 2866, further comprising laterally and rotatably moving the stage during said directing energy and said detecting energy.

2870. The method of claim 2866, wherein the illumination system comprises a single energy source.

2871. The method of claim 2866, wherein the illumination system comprises more than one energy source.

2872. The method of claim 2866, wherein the detection system comprises a single energy sensitive device.

2873. The method of claim 2866, wherein the detection system comprises more than one energy sensitive devices.

2874. The method of claim 2866, wherein the measurement device further comprises a modulated optical reflectometer.

2875. The method of claim 2866, wherein the measurement device further comprises an X-ray reflectance device.

2876. The method of claim 2866, wherein the measurement device further comprises an eddy current device.

2877. The method of claim 2866, wherein the measurement device further comprises a photo-acoustic device.

2878. The method of claim 2866, wherein the measurement device further comprises a spectroscopic ellipsometer.

2879. The method of claim 2866, wherein the measurement device further comprises a spectroscopic reflectometer.

2880. The method of claim 2866, wherein the measurement device further comprises a dual beam spectrophotometer.

2881. The method of claim 2866, wherein the measurement device further comprises a non-imaging scatterometer.

2882. The method of claim 2866, wherein the measurement device further comprises a scatterometer.

2883. The method of claim 2866, wherein the measurement device further comprises a spectroscopic scatterometer.

2884. The method of claim 2866, wherein the measurement device further comprises a reflectometer.

2885. The method of claim 2866, wherein the measurement device further comprises an ellipsometer.

2886. The method of claim 2866, wherein the measurement device further comprises a non-imaging bright field device.

2887. The method of claim 2866, wherein the measurement device further comprises a non-imaging dark field device.

2888. The method of claim 2866, wherein the measurement device further comprises a non-imaging bright field and dark field device.

2889. The method of claim 2866, wherein the measurement device further comprises a bright field imaging device.

2890. The method of claim 2866, wherein the measurement device further comprises a dark field imaging device.

2891. The method of claim 2866, wherein the measurement device further comprises a bright field and dark field imaging device.

2892. The method of claim 2866, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a modulated optical reflectometer, an X-ray reflectance device, an eddy current device, a photo-acoustic device, a spectroscopic ellipsometer, a spectroscopic reflectometer, dual beam spectrophotometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a non-imaging bright field device, a non-

imaging dark field device, a non-imaging bright field and dark field device, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2893. The method of claim 2866, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2894. The method of claim 2866, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the specimen.

2895. The method of claim 2866, wherein the characteristic of the implanted region is selected from the group consisting of a presence of ions in the implanted region, a concentration of ions in the implanted region, a depth of ions in the implanted region, and a distribution profile of the implanted region.

2896. The method of claim 2866, wherein the defects comprise micro defects and macro defects.

2897. The method of claim 2866, wherein the defects comprises micro defects or macro defects.

2898. The method of claim 2866, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2899. The method of claim 2898, wherein the defects comprise macro defects.

2900. The method of claim 2866, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

2901. The method of claim 2866, further comprising directing energy toward multiple locations on the surface of the specimen substantially simultaneously and detecting energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

2902. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool.

2903. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

2904. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

2905. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of an ion implanter and a thermal tool.

2906. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a wafer handler, and wherein disposing the specimen upon the stage comprises moving the specimen from the process tool to the stage using the wafer handler.

2907. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, the method further comprising moving the specimen to the process tool subsequent to said directing and said detecting using the stage.

2908. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, the method further comprising determining at least the two properties of the specimen while the specimen is waiting between process steps.

2909. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2910. The method of claim 2866, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2911. The method of claim 2866, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2912. The method of claim 2866, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2913. The method of claim 2866, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2914. The method of claim 2866, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2915. The method of claim 2866, wherein disposing the specimen upon the stage comprises disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

2916. The method of claim 2915, further comprising performing said directing and said detecting during the process step.

2917. The method of claim 2916, further comprising obtaining a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

2918. The method of claim 2916, further comprising altering a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

2919. The method of claim 2866, further comprising moving the specimen from a first process chamber to a second process chamber using the stage, wherein the first process chamber and the second process chamber are disposed within a process tool.

2920. The method of claim 2919, further comprising performing said directing and said detecting during said moving the specimen from the first process chamber to the second process chamber.

2921. The method of claim 2866, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

2922. The method of claim 2866, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

2923. The method of claim 2922, further comprising generating an output signal if at least one of the determined properties of the specimen are outside of the predetermined range for the property.

2924. The method of claim 2866, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

2925. The method of claim 2866, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

2926. The method of claim 2866, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

2927. The method of claim 2866, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

2928. The method of claim 2866, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

2929. The method of claim 2866, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

2930. The method of claim 2929, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

2931. The method of claim 2929, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further

comprising monitoring output signals of the plurality of measurement devices using the database.

2932. The method of claim 2866, wherein a stand alone system is coupled to the measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device with the stand alone system.

2933. The method of claim 2866, wherein a stand alone system is coupled to the measurement device and at least one additional measurement device, the method further comprising calibrating the stand alone system with a calibration standard and calibrating the measurement device an at least the one additional measurement device with the stand alone system.

2934. The method of claim 2866, further comprising determining at least the two properties of the specimen at more than one position on the specimen, wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

2935. The method of claim 2866, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedback control technique.

2936. The method of claim 2866, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedforward control technique.

2937. The method of claim 2866, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

2938. The method of claim 2937, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

2939. The method of claim 2938, further comprising altering the parameter of the instrument in response to the relationship.

2940. The method of claim 2866, further comprising altering a parameter of one or more instruments coupled to each of a plurality of process tools in response to at least one of the determined properties.

2941. The method of claim 2866, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

2942. The method of claim 2941, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

2943. The method of claim 2941, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

2944. A computer-implemented method for controlling a system configured to determine at least two properties of a specimen during use, wherein the system comprises a measurement device, comprising:

controlling the measurement device, wherein the measurement device comprises an illumination system and a detection system, and wherein the measurement device is coupled to a stage, comprising:

controlling the illumination system to direct energy toward a surface of the specimen;

controlling the detection system to detect energy propagating from the surface of the specimen; and

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a characteristic of an implanted region of the specimen, and wherein the second property comprises a presence of defects on the specimen.

2945. The method of claim 2944, further comprising controlling the stage, wherein the stage is configured to support the specimen.

2946. The method of claim 2944, further comprising controlling the stage to laterally move the stage during said directing energy and said detecting energy.

2947. The method of claim 2944, further comprising controlling the stage to rotatably move the stage during said directing energy and said detecting energy.

2948. The method of claim 2944, further comprising controlling the stage to laterally and rotatably move the stage during said directing energy and said detecting energy.

2949. The method of claim 2944, wherein the illumination system comprises a single energy source.

2950. The method of claim 2944, wherein the illumination system comprises more than one energy source.

2951. The method of claim 2944, wherein the detection system comprises a single energy sensitive device.

2952. The method of claim 2944, wherein the detection system comprises more than one energy sensitive devices.

2953. The method of claim 2944, wherein the measurement device further comprises a modulated optical reflectometer.

2954. The method of claim 2944, wherein the measurement device further comprises an X-ray reflectance device.

2955. The method of claim 2944, wherein the measurement device further comprises an eddy current device.

2956. The method of claim 2944, wherein the measurement device further comprises a photo-acoustic device.

2957. The method of claim 2944, wherein the measurement device further comprises a spectroscopic ellipsometer.

2958. The method of claim 2944, wherein the measurement device further comprises a spectroscopic reflectometer.

2959. The method of claim 2944, wherein the measurement device further comprises a dual beam spectrophotometer.

2960. The method of claim 2944, wherein the measurement device further comprises a non-imaging scatterometer.

2961. The method of claim 2944, wherein the measurement device further comprises a scatterometer.

2962. The method of claim 2944, wherein the measurement device further comprises a spectroscopic scatterometer.

2963. The method of claim 2944, wherein the measurement device further comprises a reflectometer.

2964. The method of claim 2944, wherein the measurement device further comprises an ellipsometer.

2965. The method of claim 2944, wherein the measurement device further comprises a non-imaging bright field device.

2966. The method of claim 2944, wherein the measurement device further comprises a non-imaging dark field device.

2967. The method of claim 2944, wherein the measurement device further comprises a non-imaging bright field and dark field device.

2968. The method of claim 2944, wherein the measurement device further comprises a bright field imaging device.

2969. The method of claim 2944, wherein the measurement device further comprises a dark field imaging device.

2970. The method of claim 2944, wherein the measurement device further comprises a bright field and dark field imaging device.

2971. The method of claim 2944, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a modulated optical reflectometer, an X-ray reflectance device, an eddy current device, a photo-

acoustic device, a spectroscopic ellipsometer, a spectroscopic reflectometer, dual beam spectrophotometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

2972. The method of claim 2944, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

2973. The method of claim 2944, wherein the measurement device further comprises non-optical components, and wherein controlling the detection system to detect energy comprises controlling the non-optical components to measure a non-optical characteristic of the specimen.

2974. The method of claim 2944, wherein the characteristic of the implanted region is selected from the group consisting of a presence of ions in the implanted region, a concentration of ions in the implanted region, a depth of the implanted region, and a distribution profile of the implanted region.

2975. The method of claim 2944, wherein the defects comprise micro defects and macro defects.

2976. The method of claim 2944, wherein the defects comprises micro defects or macro defects.

2977. The method of claim 2944, further comprising:

controlling the illumination system to direct energy toward a bottom surface of the specimen; and

controlling the detection system to detect energy propagating from the bottom surface of the specimen, wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

2978. The method of claim 2977, wherein the defects comprise macro defects.

2979. The method of claim 2944, wherein processing the one or more output signals to determine the first and second properties of the specimen comprises substantially simultaneously determining the first and second properties of the specimen.

2980. The method of claim 2944, further comprising controlling the illumination system to direct energy toward multiple locations on the surface of the specimen substantially simultaneously and controlling the detection system to detect energy propagating from the multiple locations substantially simultaneously such that one or more of the at least two properties of the specimen can be determined at the multiple locations substantially simultaneously.

2981. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool.

2982. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are arranged laterally proximate to the process tool.

2983. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, and wherein the stage and the measurement device are disposed within the process tool.

2984. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of an ion implanter and a thermal tool.

2985. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage, and wherein the wafer handler is coupled to the process tool.

2986. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling the stage to move the specimen from the system to the process tool.

2987. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, the method further comprising controlling a wafer handler to move the specimen from the process tool to the stage such that at least the two properties of the specimen can be determined while the specimen is waiting between process steps.

2988. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the support device is substantially parallel to an upper surface of the stage.

2989. The method of claim 2944, wherein the stage and the measurement device are coupled to a process tool, wherein the process tool comprises a support device configured to support the specimen during a process step, and wherein an upper surface of the stage is angled with respect to an upper surface of the support device.

2990. The method of claim 2944, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is coupled to a process tool.

2991. The method of claim 2944, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is disposed within a process tool.

2992. The method of claim 2944, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged laterally proximate to a process chamber of a process tool.

2993. The method of claim 2944, wherein the stage and the measurement device are disposed within a measurement chamber, and wherein the measurement chamber is arranged vertically proximate to a process chamber of a process tool.

2994. The method of claim 2944, further comprising disposing the specimen upon a support device disposed within a process chamber of a process tool, and wherein the support device is configured to support the specimen during a process step.

2995. The method of claim 2994, further comprising controlling the illumination system and controlling the detection system during the process step.

2996. The method of claim 2994, further comprising controlling the system to obtain a signature characterizing the process step, wherein the signature comprises at least one singularity representative of an end of the process step.

2997. The method of claim 2994, further comprising controlling the system to alter a parameter of one or more instruments coupled to the process tool in response to at least one of the determined properties using an in situ control technique.

2998. The method of claim 2944, further comprising controlling the stage to move the specimen from a first process chamber to a second process chamber, wherein the first process chamber and the second process chamber are disposed within a process tool.

2999. The method of claim 2998, further comprising controlling the illumination system and controlling the detection system during said moving the specimen from the first process chamber to the second process chamber.

3000. The method of claim 2944, further comprising comparing at least one of the determined properties of the specimen and determined properties of a plurality of specimens.

3001. The method of claim 2944, further comprising comparing at least one of the determined properties of the specimen to a predetermined range for the property.

3002. The method of claim 3001, further comprising generating an output signal if at least one of the determined properties of the specimen are outside of the predetermined range for the property.

3003. The method of claim 2944, further comprising altering a sampling frequency of the measurement device in response to at least one of the determined properties of the specimen.

3004. The method of claim 2944, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedback control technique.

3005. The method of claim 2944, further comprising altering a parameter of one or more instruments coupled to the measurement device in response to at least one of the determined properties using a feedforward control technique.

3006. The method of claim 2944, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising calibrating the measurement device using the database.

3007. The method of claim 2944, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, the method further comprising monitoring output signals of the measurement device using the database.

3008. The method of claim 2944, further comprising generating a database, wherein the database comprises the determined first and second properties of the specimen, and wherein the database further comprises first and second properties of a plurality of specimens.

3009. The method of claim 3008, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising calibrating the plurality of measurement devices using the database.

3010. The method of claim 3008, wherein the first and second properties of the plurality of specimens are generated using a plurality of measurement devices, the method further comprising monitoring output signals of the plurality of measurement devices using the database.

3011. The method of claim 2944, wherein a stand alone system is coupled to the system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system.

3012. The method of claim 2944, wherein a stand alone system is coupled to the system and at least one additional system, the method further comprising controlling the stand alone system to calibrate the stand alone system with a calibration standard and further controlling the stand alone system to calibrate the system and at least the one additional system.

3013. The method of claim 2944, wherein the system is further configured to determine at least the two properties of the specimen at more than one position on the specimen, and wherein the specimen comprises a wafer, the method further comprising altering at least one parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties of the specimen at the more than one position on the specimen to reduce within wafer variation of at least one of the determined properties.

3014. The method of claim 2944, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedback control technique.

3015. The method of claim 2944, further comprising altering a parameter of one or more instruments coupled to a process tool in response to at least one of the determined properties using a feedforward control technique.

3016. The method of claim 2944, further comprising monitoring a parameter of one or more instruments coupled to the process tool.

3017. The method of claim 3016, further comprising determining a relationship between at least one of the determined properties and at least one of the monitored parameters.

3018. The method of claim 3017, further comprising altering a parameter of at least one of the instruments in response to the relationship.

3019. The method of claim 2944, further comprising altering a parameter of one or more instruments coupled to each of a plurality of process tools in response to at least one of the determined properties of the specimen.

3020. The method of claim 2944, wherein processing the one or more output signals comprises:

at least partially processing the one or more output signals using a local processor, wherein the local processor is coupled to the measurement device;

sending the partially processed one or more output signals from the local processor to a remote controller computer; and

further processing the partially processed one or more output signals using the remote controller computer.

3021. The method of claim 3020, wherein at least partially processing the one or more output signals comprises determining the first and second properties of the specimen.

3022. The method of claim 3020, wherein further processing the partially processed one or more output signals comprises determining the first and second properties of the specimen.

3023. A semiconductor device fabricated by a method, the method comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a characteristic of an implanted region of the specimen, and wherein the second property comprises a presence of defects on the specimen.

3024. The device of claim 3023, wherein the illumination system comprises a single energy source.

3025. The device of claim 3023, wherein the illumination system comprises more than one energy source.

3026. The device of claim 3023, wherein the detection system comprises a single energy sensitive device.

3027. The device of claim 3023, wherein the detection system comprises more than one energy sensitive devices.

3028. The device of claim 3023, wherein the measurement device further comprises a modulated optical reflectometer.

3029. The device of claim 3023, wherein the measurement device further comprises an X-ray reflectance device.

3030. The device of claim 3023, wherein the measurement device further comprises an eddy current device.

3031. The device of claim 3023, wherein the measurement device further comprises a photo-acoustic device.

3032. The device of claim 3023, wherein the measurement device further comprises a spectroscopic ellipsometer.

3033. The device of claim 3023, wherein the measurement device further comprises a spectroscopic reflectometer.

3034. The device of claim 3023, wherein the measurement device further comprises a dual beam spectrophotometer.

3035. The device of claim 3023, wherein the measurement device further comprises a non-imaging scatterometer.

3036. The device of claim 3023, wherein the measurement device further comprises a scatterometer.

3037. The device of claim 3023, wherein the measurement device further comprises a spectroscopic scatterometer.

3038. The device of claim 3023, wherein the measurement device further comprises a reflectometer.

3039. The device of claim 3023, wherein the measurement device further comprises an ellipsometer.

3040. The device of claim 3023, wherein the measurement device further comprises a non-imaging bright field device.

3041. The device of claim 3023, wherein the measurement device further comprises a non-imaging dark field device.

3042. The device of claim 3023, wherein the measurement device further comprises a non-imaging bright field and dark field device.

3043. The device of claim 3023, wherein the measurement device further comprises a bright field imaging device.

3044. The device of claim 3023, wherein the measurement device further comprises a dark field imaging device.

3045. The device of claim 3023, wherein the measurement device further comprises a bright field and dark field imaging device.

3046. The device of claim 3023, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a modulated optical reflectometer, an X-ray reflectance device, an eddy current device, a photo-acoustic device, a spectroscopic ellipsometer, a spectroscopic reflectometer, dual beam spectrophotometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

3047. The device of claim 3023, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical

elements of the first measurement device comprise optical elements of the second measurement device.

3048. The device of claim 3023, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the specimen.

3049. The device of claim 3023, wherein the characteristic of the implanted region is selected from the group consisting of a presence of ions in the implanted region, a concentration of ions in the implanted region, a depth of the implanted region, and a distribution profile of the implanted region.

3050. The device of claim 3023, wherein the defects comprise micro defects and macro defects.

3051. The device of claim 3023, wherein the defects comprises micro defects or macro defects.

3052. The device of claim 3023, further comprising:

directing energy toward a bottom surface of the specimen; and

detecting energy propagating from the bottom surface of the specimen, wherein the second property further comprises a presence of defects on the bottom surface of the specimen.

3053. The device of claim 3052, wherein the defects comprise macro defects.

3054. The device of claim 3023, wherein the stage and the measurement device are coupled to a process tool.

3055. The device of claim 3023, wherein the stage and the measurement device are coupled to a process tool, and wherein the process tool is selected from the group consisting of an ion implanter and a thermal tool.

3056. A method for fabricating a semiconductor device, comprising:

forming a portion of the semiconductor device upon a specimen;

disposing the specimen upon a stage, wherein the stage is coupled to a measurement device, and wherein the measurement device comprises an illumination system and a detection system;

directing energy toward a surface of the specimen using the illumination system;

detecting energy propagating from the surface of the specimen using the detection system;

generating one or more output signals responsive to the detected energy; and

processing the one or more output signals to determine a first property and a second property of the specimen, wherein the first property comprises a characteristic of an implanted region of the specimen, and wherein the second property comprises a presence of defects on the specimen.

3057. The method of claim 3056, wherein the illumination system comprises a single energy source.

3058. The method of claim 3056, wherein the illumination system comprises more than one energy source.

3059. The method of claim 3056, wherein the detection system comprises a single energy sensitive device.

3060. The method of claim 3056, wherein the detection system comprises more than one energy sensitive devices.

3061. The method of claim 3056, wherein the measurement device is selected from the group consisting of a modulated optical reflectometer, an X-ray reflectance device, an eddy current device, a photo-acoustic device, a spectroscopic ellipsometer, a spectroscopic reflectometer, dual beam spectrophotometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a non-imaging bright field device, a non-imaging dark field device, a non-imaging bright field and dark field device, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

3062. The method of claim 3056, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein the first and second measurement devices are selected from the group consisting of a modulated optical reflectometer, an X-ray reflectance device, an eddy current device, a photo-acoustic device, a spectroscopic ellipsometer, a spectroscopic reflectometer, dual beam spectrophotometer, a non-imaging scatterometer, a scatterometer, a spectroscopic scatterometer, a reflectometer, an ellipsometer, a non-imaging bright field device, a non-

imaging dark field device, a non-imaging bright field and dark field device, a bright field imaging device, a dark field imaging device, and a bright field and dark field imaging device.

3063. The method of claim 3056, wherein the measurement device further comprises at least a first measurement device and a second measurement device, and wherein optical elements of the first measurement device comprise optical elements of the second measurement device.

3064. The method of claim 3056, wherein the measurement device further comprises non-optical components, and wherein detecting energy comprises measuring a non-optical characteristic of the specimen.

3065. The method of claim 3056, wherein the characteristic of the implanted region is selected from the group consisting of a presence of ions in the implanted region, a concentration of ions in the implanted region, a depth of the implanted region, and a distribution profile of the implanted region.

3066. The method of claim 3056, wherein the defects comprise micro defects and macro defects.

3067. The method of claim 3056, wherein the defects comprises micro defects or macro defects.

3068. The method of claim 3056, further comprising:

directing energy toward a bottom surface of the specimen; and